131
DECEMBER 2020
ARCHITECTURAL STEEL INNOVATION
WITH BLUESCOPE

STEEL PROFILE

EASTMAN POLETTI SHERWOOD ARCHITECTS
KALBARRI SKYWALK

ANDREW BURNS ARCHITECTURE
THREE CAPES TRACK LODGES

GRIEVE GILLETT ANDERSEN
PEMBROKE MIDDLE SCHOOL REDEVELOPMENT

EDITORIAL

Welcome to *Steel Profile®* magazine edition 131. This magazine highlights the use of steel as a fundamental yet often unseen enabler for structure and celebrates its open contribution to design aesthetics.

Presented here is a carefully curated selection of five inspiring and innovative recent projects. Varied in terms of scale and design typology, these range from a sensitive heritage restoration project to low impact wilderness walking lodges, and an expressive cutting-edge city learning village.

Importantly, *Steel Profile®* magazine also celebrates people and their ideas: inspired architects, builders, engineers, fabricators, and manufacturers who have leveraged the intrinsic strength, practicality, and subtle elegance of steel to conceive and deliver classic, innovative, and modern architectural works. We feel that the projects presented here represent Australian ingenuity at its finest along with the 'can-do' attitude that makes it possible.

The structures featured within this edition of *Steel Profile®* magazine articulate the themes of sustainability, heritage, community, industry, and learning. Considerable effort has gone into understanding the backgrounds and unique challenges of each project. In these words, and pictures, we demonstrate how the architects have delivered on their clients' briefs.

Steel Profile® magazine edition 131 is a proud showcase inspiring what can be achieved with Australian steel. We hope you enjoy reading it.

For those who want more of *Steel Profile®* magazine visit steelselect.com.au/steelprofile.

We encourage you to share your projects for consideration in a future issue of *Steel Profile®* magazine. We invite you to submit projects that feature a ground-breaking or an innovative use of steel at steelselect.com.au/steelprofile/submit.

We love celebrating and writing about such projects!

Melissa Barlow
BlueScope managing editor.

ISSUE 131 CONTENTS

Principal Corporate Partner

Australian Institute of Architects

COVER PROJECT
Kalbarri Skywalk

PHOTOGRAPHER
Dermot Boyle

NUMBER 131, DECEMBER 2020

BLUESCOPE MANAGING EDITOR Melissa Barlow **PUBLISHER** Raj Nandan

CONTRIBUTING WRITERS Rachael Bernstone, Alice Blackwood, Holly Cunneen, Jan Henderson, Peter Hyatt, Matthew McDonald, Micky Pinkerton, Brydie Shephard

CONTRIBUTING PHOTOGRAPHERS Anjie Blair, Brett Boardman, Dermot Boyle, Department of Biodiversity, Conservation and Attractions, Sam Noonan

ART DIRECTOR Camille Malloch

PROJECT SUBMISSIONS To submit your project for consideration please visit steelselect.com.au/steelprofile/submit

SUBSCRIPTIONS For all subscription enquiries please contact us via steelselect.com.au/steelprofile

EDITORIAL EMAIL team@steelprofile.com.au

MAIL CORRESPONDENCE Steel Profile®, Tower A, Level 7, 201 Coward Street, Mascot, NSW 2020

ARCHITECT
Eastman Poletti Sherwood Architects

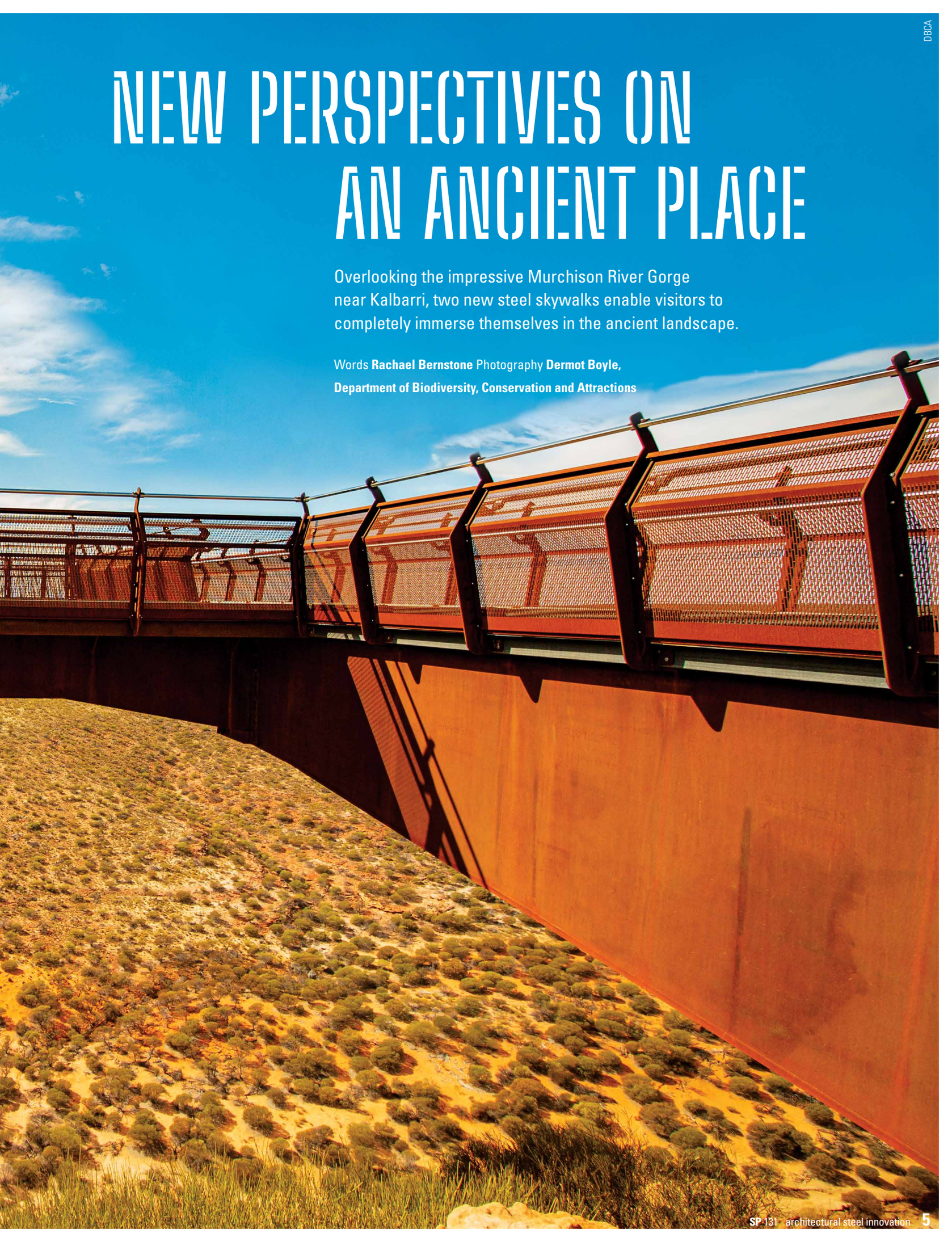
PROJECT
Kalbarri Skywalk

LOCATION
Kalbarri, Western Australia

NEW PERSPECTIVES ON AN ANCIENT PLACE

Overlooking the impressive Murchison River Gorge near Kalbarri, two new steel skywalks enable visitors to completely immerse themselves in the ancient landscape.

Words **Rachael Bernstone** Photography **Dermot Boyle, Department of Biodiversity, Conservation and Attractions**



DBCA

This new tourist attraction in WA's mid-west combines equal parts function and sculpture, and offers new vantage points from which to admire the sandstone river valley below.

Located at Kalbarri, about 600km north of Perth, the national park sits within Nanda country, and input from the local indigenous salt-water people played an important part in the design and delivery of this project. A new sign at the entrance proclaims the Nanda words for 'sky' and 'to walk': kaju yatka.

Accessible to all ages and abilities, the skywalks are the central showcase within a $13.2-million redevelopment at the national park, which delivered a new café (that operates on low to nil-emissions thanks to an off-grid power system), new car and coach parking, walking trails, interpretative signage, shade shelters and toilets.

These facilities help to reduce crowding at the nearby Nature's Window – a popular spot for photos – which is located about 1.5 kilometres upstream. In the 2019/20 financial year, the Kalbarri National Park attracted more than 200,000 visitors, a marked increase over the previous year.

Back in 2015, the Department of Biodiversity, Conservation and Attractions (DBCA) 'Parks and Wildlife' engaged Geraldton-based Eastman Poletti Sherwood Architects as principal designer for the planned tourism upgrade.

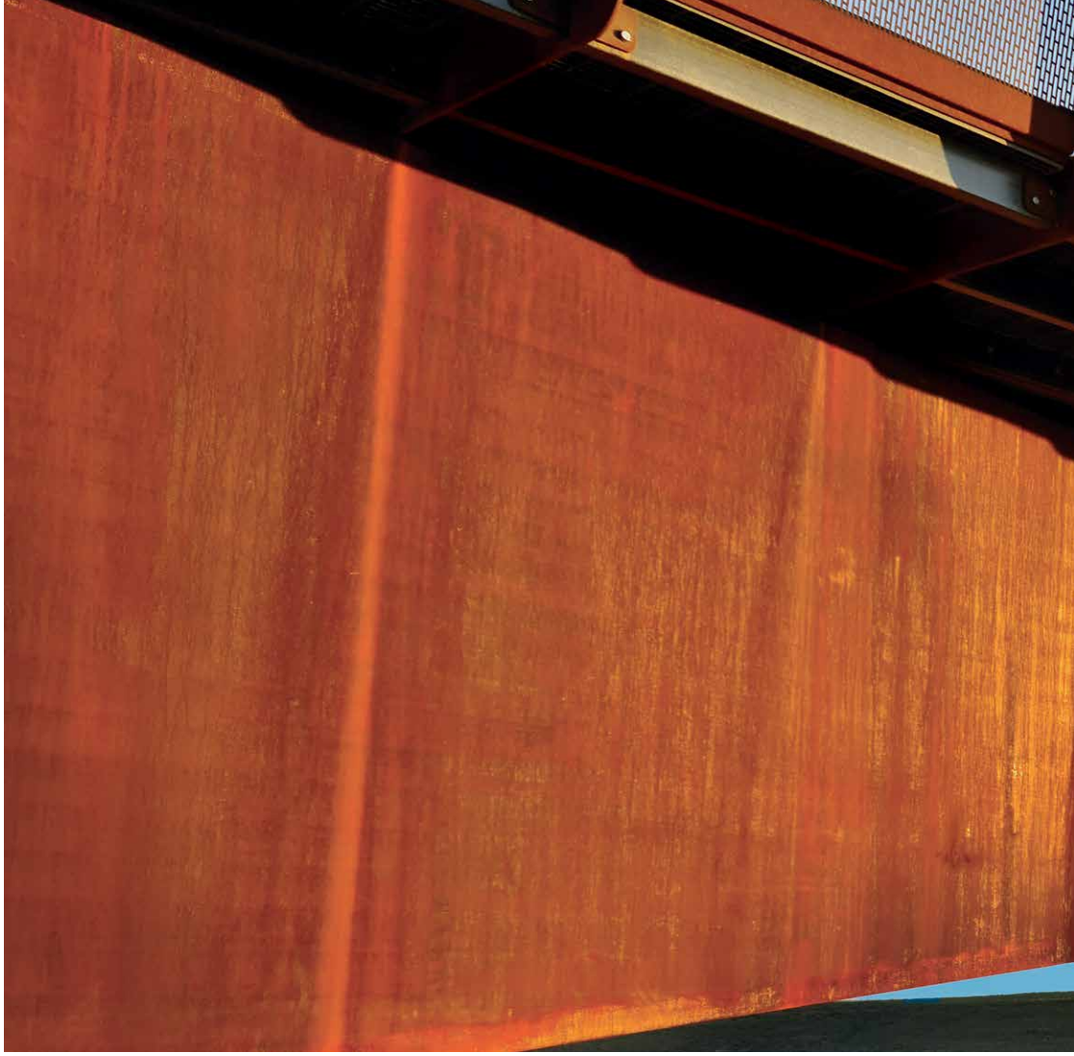
DBCA project manager Rory Chapple recalls meeting with architect Craig Poletti at the highest point on the cliff – the site of a previous lookout and where Skywalk 2 sits now – to envision a new attraction.

"Craig and I stood on the cliff edge together, mulling over how things might look there, and he was sketching," Chapple says. "We were having issues with rough roads in the park – which required a 4WD to get anywhere – so we wanted to create a drawcard that would be seen as a tangible benefit in the national park.

"We put together a business case using perspective drawings of what the skywalks might look like – developed by Craig's team – and we were able to secure the capital works funding for the entire project in 2015."

From those initial discussions, client and architect determined that the innovative structures would be created using weathering steel, in keeping with the park's management plan, which states: "The geology and landforms of the park provide a dramatic and scenic landscape. Any proposed recreation site, infrastructure or access developments in the park will require careful planning to minimise visual impacts since any visual impacts to the landscape become obvious in the predominantly low vegetation."

During the design phase, BlueScope's REDCOR® weathering steel in grade WR350LOB was chosen for several key reasons. These included the remote location of the site, and a desire to minimise maintenance over its projected 100-year lifespan.



"The geology and landforms of the park provide a dramatic and scenic landscape. Any proposed recreation site, infrastructure or access developments in the park will require careful planning..."

Steel was also an obvious choice to meet the extreme wind loadings for the site, which are equivalent to Region D cyclonic.

The use of steel enabled the structure to be fabricated in segments in Perth and transported to site to be craned into place, where it blends harmoniously with the surrounding landscape.

The national park is located on an undulating sandplain plateau of white and yellow quartz sands with patchy outcrops of laterite, which contributes a reddish tinge to the iron and aluminium-rich soil.

This particular plateau was uplifted during the Tertiary period – about 50 million years ago – and, since then, the Murchison River has carved the spectacular gorge, exposing Tumblagooda Sandstone along its length.

Because of the remote location, the project required both local and capital city-based inputs.

Perth-based consultants included Terpkos Engineering, which provided structural advice throughout the project including during the design phase; civil engineering company Bocol Constructions Pty Ltd, engaged as head contractor for the Skywalk Structures; and Alltype Engineering – based at Henderson naval base – which fabricated the steel structures.

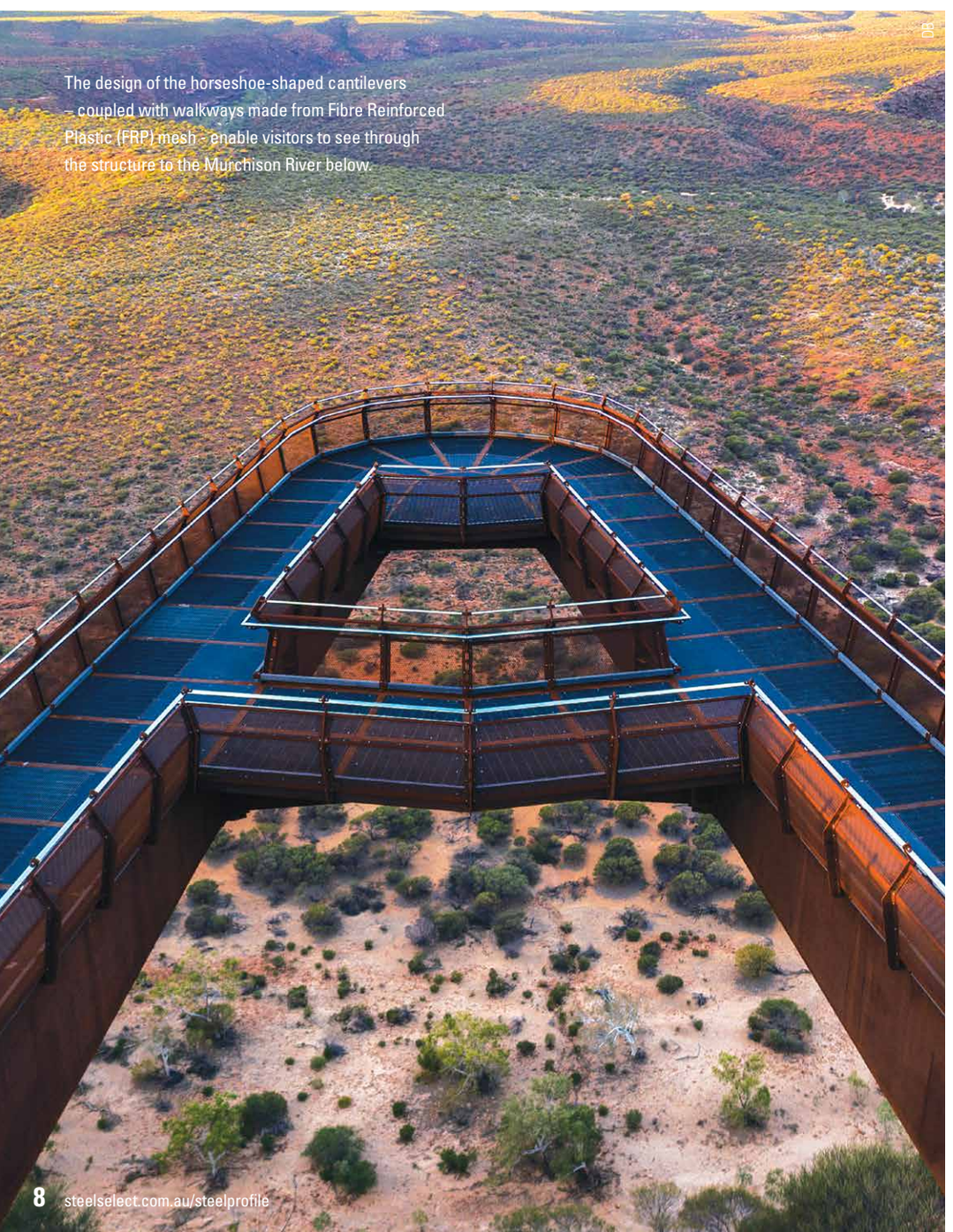
RIGHT: The platforms are revealed to visitors when they reach the cliff edge. They cantilever 18 and 25 metres respectively, and are sited 100 metres apart and 100 metres above the riverbed.

DB

The skywalk structures were fabricated using 150 tonnes of REDCOR® weathering steel supplied by BlueScope. Box beams – as seen here – range from 2 to 2.2 metres deep and form the main spines.

DB

DBCA



The design of the horseshoe-shaped cantilevers – coupled with walkways made from Fibre Reinforced Plastic (FRP) mesh - enable visitors to see through the structure to the Murchison River below.

DBCA

These companies worked alongside a number of firms from elsewhere in WA, such as Eastman Poletti Sherwood Architects and GBSC Yurra Pty Ltd – a registered builder and electrical contractor partnership entity between Geraldton Building Services and Cabinets and Yindjibarndi Aboriginal Corporation – who carried out the infrastructure contract.

During installation, the largest crane used on the site – at 350 tonnes – was transported to site from Perth, along with smaller cranes that were brought in from Geraldton.

A combined local and remote workforce carried out installation of the skywalks, assembled the kiosk and amenities buildings, and constructed the surrounding landscaping. The project was finished in the second half of 2019, for a planned official opening in April 2020.

However, that event was postponed until June 2020 because of COVID-19. Despite state border closures that have reduced the number of international and interstate visitors, visitor numbers have been up on previous years since the opening, with WA-based holiday-makers flocking to the new attraction.

Part of its appeal is the fact that the spectacular skywalks are unique in Australia – and arguably more impressive than well-known international examples, such as the Eagle Point Skywalk at the Grand Canyon in Arizona, USA, and the Glacier Skywalk at Jasper, Canada.

Here, the larger horseshoe-shaped structure extends 25 metres beyond the cliff edge, where it defies gravity thanks to 10-metre deep anchors and massive sub-surface concrete box beams.

These are concealed beneath 200m^3 of sandstone landscaping, re-using stone that was cut and dressed after being excavated from the site.

The skywalk structures were fabricated using 150 tonnes of REDCOR® weathering steel in a range of thicknesses.

The box beams, which range from 2 to 2.2 metres deep and form the main spine, are topped with Fibre Reinforced Plastic (FRP) mesh walkways – which enable viewers to effectively see through the structure to the Murchison River below – and perforated weathering steel balustrades and stainless steel handrails.

BlueScope supplied an additional 62 tonnes of REDCOR® weathering steel for the auxiliary buildings and kiosks and for interpretive signage, artworks, shades and landscaping.

In addition to the challenges posed by the site's remote location, and the degree of difficulty of the cantilevered structures, budget was a third key challenge on the project, with early costings forcing the architect and engineer to revisit the design before construction could commence.

"It was a long haul with issues around costs," says Chapple. "Craig and Paul worked hard to determine the best materials and suitability, and we had to revisit our design and work through some serious issues to get it over the line.

"For example we had to source high-tensile bolts because it was important to me as the client that they were also weathering steel. Bocol was a fantastic contractor in the way they met these challenges."

Since the new facilities opened, the response from visitors has been highly favourable, Chapple says.

"It's been really amazing. We've had a lot of people – in fact double the number of visitors over the previous 12 month period. And while COVID-19 has prevented international and interstate visitors, our local visitor numbers are up," according to Chapple.

"It's quite moving for people to go there – the structure fits in with the landscape and it's very quiet and respectful, because it was designed so that people don't see the skywalks immediately; it's a revealing experience when you come to the cliff edge."

Chapple says that visitors are also moved by smaller elements within the precinct. "The link between architecture and landscape – the steel and the rock – creates a very earthy feeling for the site, and it's obvious that the design team worked hard to integrate the architecture and the landscape," Chapple explains.

There is a strong Indigenous presence throughout, with local Nanda people working on the project all the way through: firstly providing heritage clearances; then as employees during construction and roadworks; and finally contributing to the creation of the interpretive works, including signs and aural elements.

"Now a lot of elders are taking their grandkids and kids to visit and see the art that's incorporated throughout the site – their artworks etched and sandblasted designs in concrete paths, message sticks, cut steel elements in the rooflines of the shade shelters – all of which was created by local Aboriginal artists," Chapple says.

The result is a place that makes it easy for visitors to feel at one with this ancient landscape, and that's exactly what client and architect imagined when they stood on the cliff edge back in 2015.

TOP: The Skywalks are visible from the popular Nature's Window attraction – located further upriver – so REDCOR® weathering steel was chosen to ensure they blended into the surrounding geology when seen from a distance.

TOP LEFT: REDCOR® weathering steel was used throughout the project, including on auxiliary buildings and kiosks, and for interpretive signage, artworks, shades and landscaping.

PROJECT: Kalbarri Skywalk **ARCHITECT:** Eastman Poletti Sherwood Architects **PRINCIPAL STEEL COMPONENTS:** Weathering steel, including approximately 150 tonnes of BlueScope REDCOR® weathering steel AS/NZS 3678-WR350LOB steel for the skywalks structures and viewing platforms; plus an additional 62 tonnes of REDCOR® AS/NZS 3678-WR350 steel for the auxiliary buildings, kiosks, interpretive signage, artworks, shades and landscaping. **BUILDER:** Bocol Construction Pty Ltd **STRUCTURAL ENGINEER:** Terpkos Engineering **STEEL DETAILING AND 3D BIM MODELLING:** Westplan Drafting **STEEL FABRICATOR:** Alltype Engineering **STAINLESS STEEL FABRICATION:** Bouvard Marine **PERFORATED BALUSTRADE:** Kanyana Engineering Pty Ltd **FIBRE REINFORCED PLASTIC WALKWAYS:** FRP Engineering Pty Ltd **INFRASTRUCTURE CONTRACTORS:** GBSC Yurra Pty Ltd **GROUND ANCHORS:** Fortec Australia Pty Ltd **CLIENT:** Department of Biodiversity, Conservation and Attractions (DBCA) **PROJECT COST:** $13.2 million.

BLENDING IN

Steel proved to be the ideal material for these two environmentally sensitive walking track lodges, in the wilderness south-east of Hobart.

Words **Editorial team led by Alice Blackwood**

Photography **Brett Boardman**

ARCHITECT
Andrew Burns Architecture

PROJECT
Three Capes Track Lodges

LOCATION
Tasman Peninsula, Tasmania

Tasmania's spectacular wilderness areas are renowned for their rugged beauty and pristine habitat. Inspired by the environment, many intrepid travellers have visited to explore the terrain by foot, so the tradition of accommodation-based guided walks in Tasmania is well-established.

The first walk – at Cradle Mountain – was launched in 1987 by architect Ken Latona and town planner Joan Masterman. They pioneered the early growth of comfortable camping and environmentally friendly tourism at multiple sites across Tasmania.

In the early days, some saw this type of development as a threat to the natural environment, but today it generates little opposition. Indeed, guided walks with eco-friendly overnight accommodation lodges are well-accepted throughout the community.

Latona and Masterman sold their Tasmanian Walking Company (TWC) to Brett Godfrey and Rob Sherrard, both of whom are committed to maintaining its legacy. In 2016, TWC appointed architect Andrew Burns to oversee the design and development of new facilities along the existing Three Capes Track (where a publicly owned walk has operated since 2015).

The resulting Three Capes Lodge Walk has facilities at two sites: guests spend the first night at Crescent Lodge (to the west of the Tasman Peninsula) and the second and third nights at Pillar Lodge (to the east).

Latona famously remarked: "I really think that people go to these places to see the places. They don't go there to see fancy buildings. The architecture can be quite humble."

This ethos informed Burns' approach to the Three Capes project. "The client all along said that the hero in this project was the landscape, and the architecture should heighten the experience of the landscape, not dominate it," he explains.

Burns also took design cues from Latona's iconic Bay of Fires Lodge (2000). "We tried to maintain the DNA of that project," he says.

This is partly evident in the linear planning, which Burns describes as "a logical typology for a lodge building", because it leads the eye towards the view.

It can also be seen in various details throughout the new buildings, such as the profiled steel roof sheeting; the eaves detailing that relies on exposed outriggers to eliminate the need for rafters in the eaves; and the combination of lightweight steel and timber-framed structures, which help to minimise the impact on the environment.

The geography and terrain are vastly different at Bay of Fires – where the track hugs the sandy coastline and provides an easier gradient for walkers – and Three Capes, where rugged and steep terrain demands greater fitness levels, especially to climb dolerite cliffs that rise up to 300 metres above sea level.

This contrast necessitated a different design response. Burns spent much time getting to know both sites at Three Capes, marking them out to

Both Crescent Lodge and Cape Pillar Lodge (pictured here) follow a linear typology, which references Latona's Bay of Fires Lodge (2000) to prioritise the spectacular views.

LEFT: The interiors of Crescent Lodge frame the picturesque coastline.

BELOW LEFT: The Bell 214B-2950HP 'Heavy-Lifter' helicopter – on loan from the fire service – delivers a pre-fabricated sleeping pod onto its steel frame.

BELOW RIGHT: The slim roofing on Crescent Lodge is supported by lightweight steel purlins and CHS outriggers, in a reinterpretation of the characteristic steel detailing of Latona's Bay of Fires Lodge.

"The client all along said that the hero in this project was the landscape, and the architecture should heighten the experience of the landscape, not dominate it."

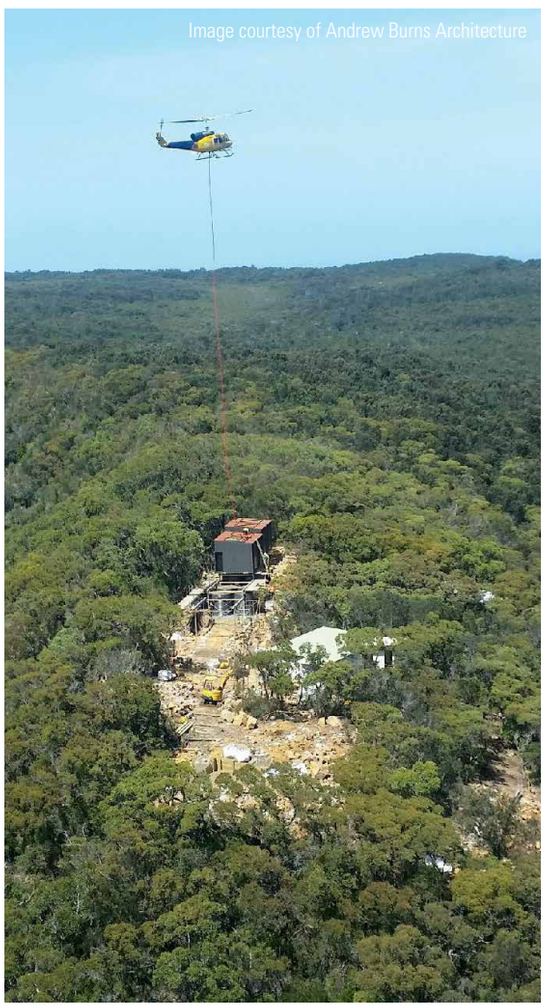
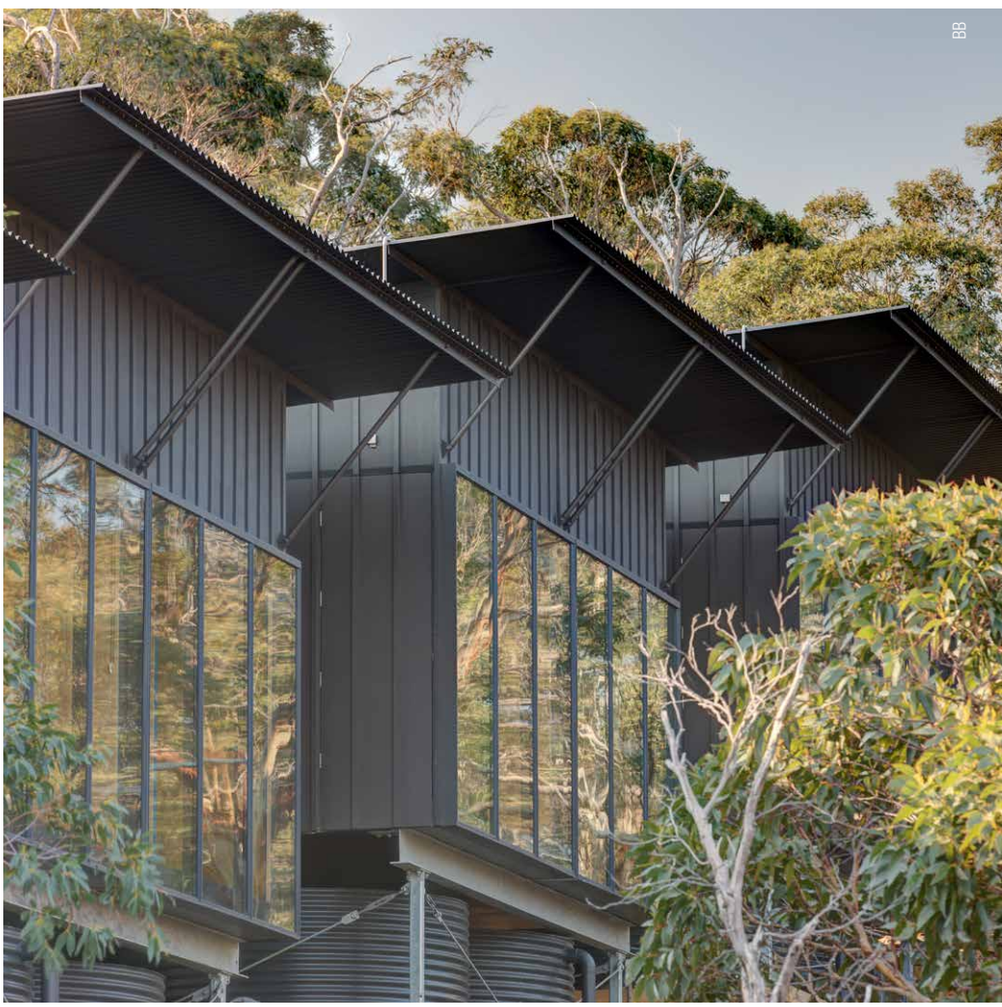


Image courtesy of Andrew Burns Architecture



ensure the buildings sit well within the topography, and take full advantage of sensational views.

He started by locating the main dining and communal areas at each site – on axes with extraordinary views towards Cape Raoul and Cape Hauy – before moving on to the accommodation pods.

His design was also informed by multiple constraints, including scenic protection overlays at both sites.

Crescent Lodge is sited on a ridge with views to heritage-listed Port Arthur, so views from the historic site required the roof structure to be set well below the tree canopy line. Pillar Lodge had to remain largely invisible from the nearby public walking track, which is administered by the Tasmanian Parks and Wildlife Service.

Another major design challenge arose from the remote location and limited access, because everything from building materials to construction equipment to workers had to be flown in by helicopter.

And the undulating and rocky ground at both sites meant that neither offered a suitable landing place to offload and store materials.

Consequently, the buildings were designed to allow maximum flexibility in construction. The two sites utilise the same structural systems, and steel was integral to the project due to its great strength, slenderness and spanning capacity.

"There were some very long span openings, up to 10 metres," Burns says. "The intention of this was to open the building dramatically to the landscape. The long spans were achieved with steel."

In reviewing the design of both lodges – and drawing on Latona's model – Burns observes that there is almost the sense of an over-scaled house with all the domestic intimacy that implies.

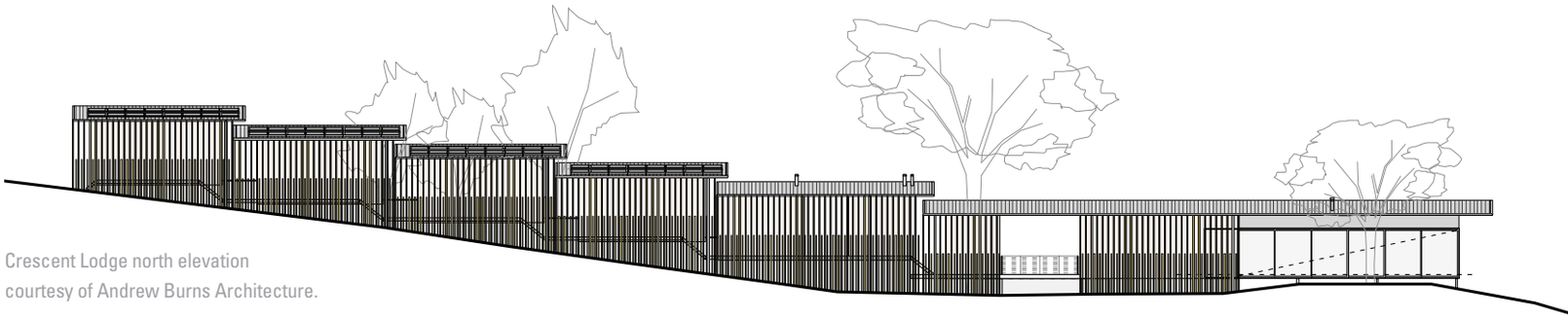
Here, the kitchen/living/dining space is the central gathering point, a low-key area where guides and guests can mingle. A secondary lounge area peels off from the main space, accessible via an outdoor walkway.

At Crescent Lodge the red ochre of the surrounding rocks is picked up in the palette of the upholstery, while at Pillar Lodge the khaki green interiors reflect the surrounding eucalypts.

The entire project was prefabricated by builder Adam Ritson of AJR Construct in Devonport, which produced components of various sizes that ranged from individual steel beams and columns to trusses (for the sub-floor structure and communal areas) to prefabricated modules (for the sleeping quarters).

These components were transported by road to a nearby landing stage seven minutes' flight away, and then flown in by helicopter and carefully positioned into place from the air.

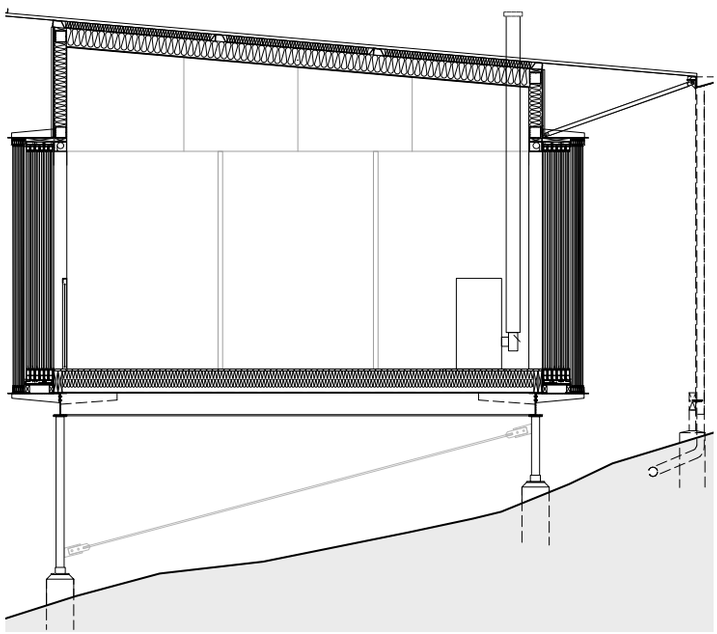
Most of these airlifts were carried out using a Squirrel V2 helicopter, with a load limit of about 800 to1,000 kilograms (at that altitude), however some of the larger steel components, pre-fabricated modules and lintels were lifted into place using a Bell 214B-2950HP 'Heavy-Lifter' helicopter with a 2.7-tonne limit, on temporary loan from duty with Tasmania's Fire Service.



Crescent Lodge north elevation
courtesy of Andrew Burns Architecture.

OPPOSITE: With scenic protection overlays in place, Crescent Lodge was required to sit well below the tree line; the COLORBOND® steel in the colour Monument® on the roofs helps to blend the lodge into the landscape.

BELOW: The lodges (Cape Pillar pictured here) are sited amidst the 10,755 hectares of Tasman National Park.



Detail section courtesy of Andrew Burns Architecture.

"We wanted this building to display a clear lineage to [Ken Latona's Bay of Fires Lodge], so we reinterpreted the characteristic steel detailing in that project, particularly the eave outriggers and metal roof sheeting."

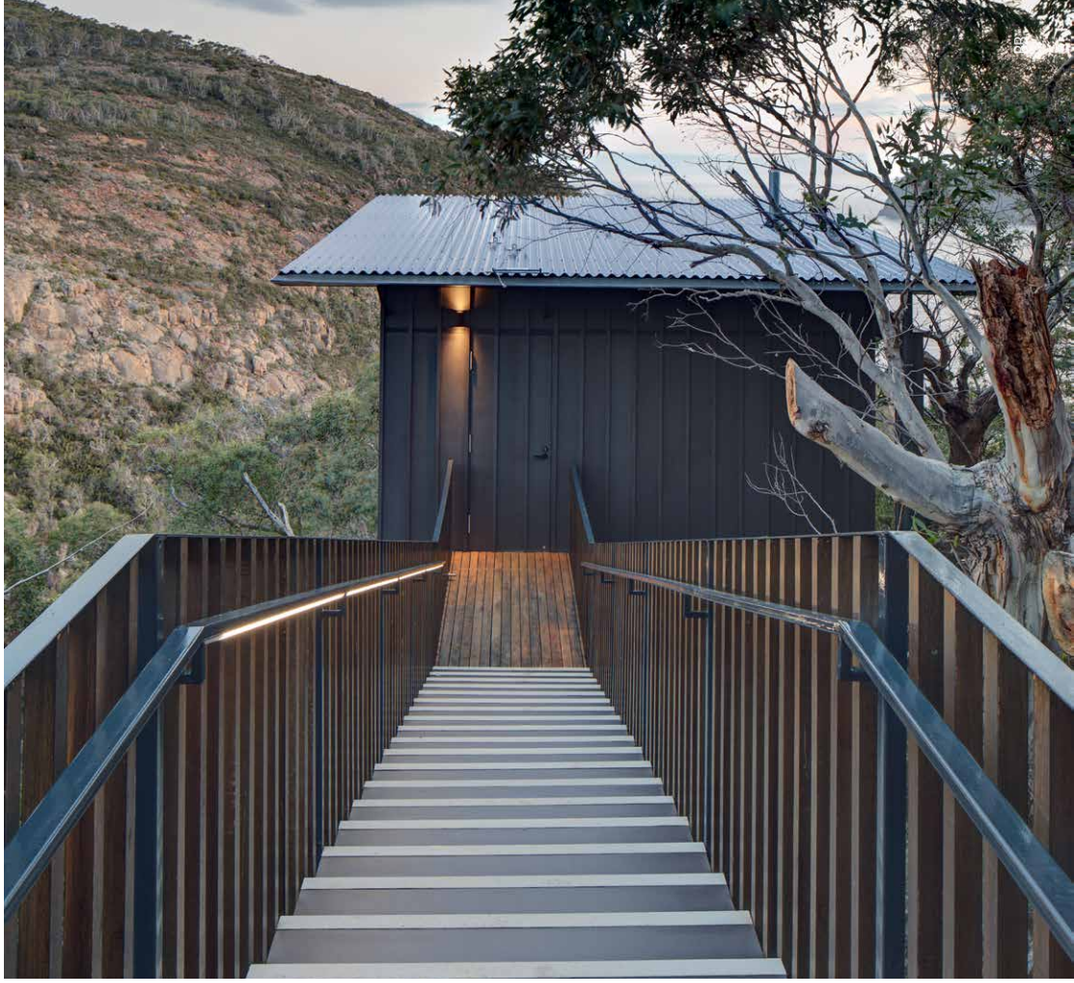
An additional challenge arose when it was discovered that a colony of White-breasted Sea Eagles – Australia's second largest raptor – lived on the initial flight path, so an adjustment of flight routes was quickly devised.

Galvanised steel was the material of choice for the subfloor framing components (Square Hollow Section [SHS], Rectangular Hollow Section [RHS], and I-beams) to achieve absolute stability for the structures, and to accommodate 23 underfloor* custom-made AQUAPLATE® steel rainwater tanks.

AQUAPLATE® steel was developed specifically for the storage of drinking water; it is produced with a base of galvanised steel that is laminated with a food-grade polymer film on the inside. Because the tanks are visible below the structures, the outer surface was pre-painted in the COLORBOND® steel colour Monument® to complement the lodges' colour palette.

Across both sites, the distinctive roof elements – featuring generous eaves and a dark-toned palette – blend in well with the bush environment.

"We used COLORBOND® steel in the LYSAGHT CUSTOM ORB® ACCENT® 35 profile in the colour Monument®," says Burns. This profile is known for its striking visual appeal, achieved through corrugations 120 per cent deeper and 50 per cent



The expansive, open-plan living area is the centrepiece in Crescent Lodge, where the long-span opening is supported by a frame of structural steel, providing uninterrupted views of the Tasmanian bushland and coastline.

wider than a conventional corrugated profile. "It's quite a chunky profile with its thicker gauge and a longer spanning capacity, which enabled a very minimal roof structure with limited steel purlins," he says.

Importantly, the overhang in the roof* meant that both the upper and underside would be visible, so the material was a custom order, because it was painted in the colour Monument® on both sides.

"That was a special run," notes the builder Adam Ritson. "Because the roof is an honest thing, you can see the underside of the steel everywhere where it overhangs."

Ritson adds that the nature of delivery meant that all of the steel components had to be carefully wrapped and protected for transport. "That's another thing to consider when you're flying stuff in that's pre-finished," he explains. "You've got to strap it up so it won't fall apart in flight and you've also got to protect and be prepared for the pilot having to land things quite hard. Sometimes the helicopter hits a bit of turbulence, so things have got to be pretty robust and well-protected."

The dark Monument® colour of the roofing plays a key role in the overall palette. Burns points out that the architects followed a general principle of layering from dark tones externally to lighter tones internally.

Contrasting with the darkness of the steel, the warmth of timber was employed on the exterior façade, where Blackbutt screening is used to break up the fibre cement sheet cladding (painted in Murobond® Bridge Paint in the colour Carbon). The timber screening is stained in four gradient colours, from clear to black, to blend with the surrounding landscape.

Internally, lighter coloured timber veneers – primarily Tasmanian ash – were used to match to the surrounding landscape.

Further refinement is also apparent in the way the steel-framed balustrading subtly links the timber walkways and decking. Their soft, recessive dark tone connects the buildings to the bush surrounding them.

The sites themselves and the general environmental considerations make the lodges largely self-sufficient. They produce their own power and water. Wastewater (and general waste) needs to be airlifted out to avoid foreign nutrients entering the soil, while sophisticated shower fittings ensure highly efficient use of water.

These features, together with the elevated structures, including steel and timber walkways, ensure that the lodges have a low impact on the environment while still offering a cosy and indeed luxurious end-of-day experience for the walkers.

"We wanted the buildings to display a clear lineage to [Ken Latona's Bay of Fires Lodge], so we reinterpreted the characteristic steel detailing in that project, particularly the eave outriggers and metal roof sheeting," says Burns.

Fundamental to the whole strategy – and going back to Ken Latona's philosophy – was to "touch this earth lightly", as architect Glenn Murcutt famously said. The steel roofing seems to cantilever almost like a feather beyond the edge of the building, thanks to the slender steel outriggers that support the eaves, which allowed the main members in the walls to be kept very slim.

"This was in keeping with our architectural intent of creating a sense of lightness in the landscape," says Burns.

For all of the people involved, this was an incredibly challenging yet highly rewarding project. For the builder Adam Ritson, who has delivered many remote and prefabricated projects, this one held a special pride of place. "It's an out-of-the-box job, there's no doubt," he said.

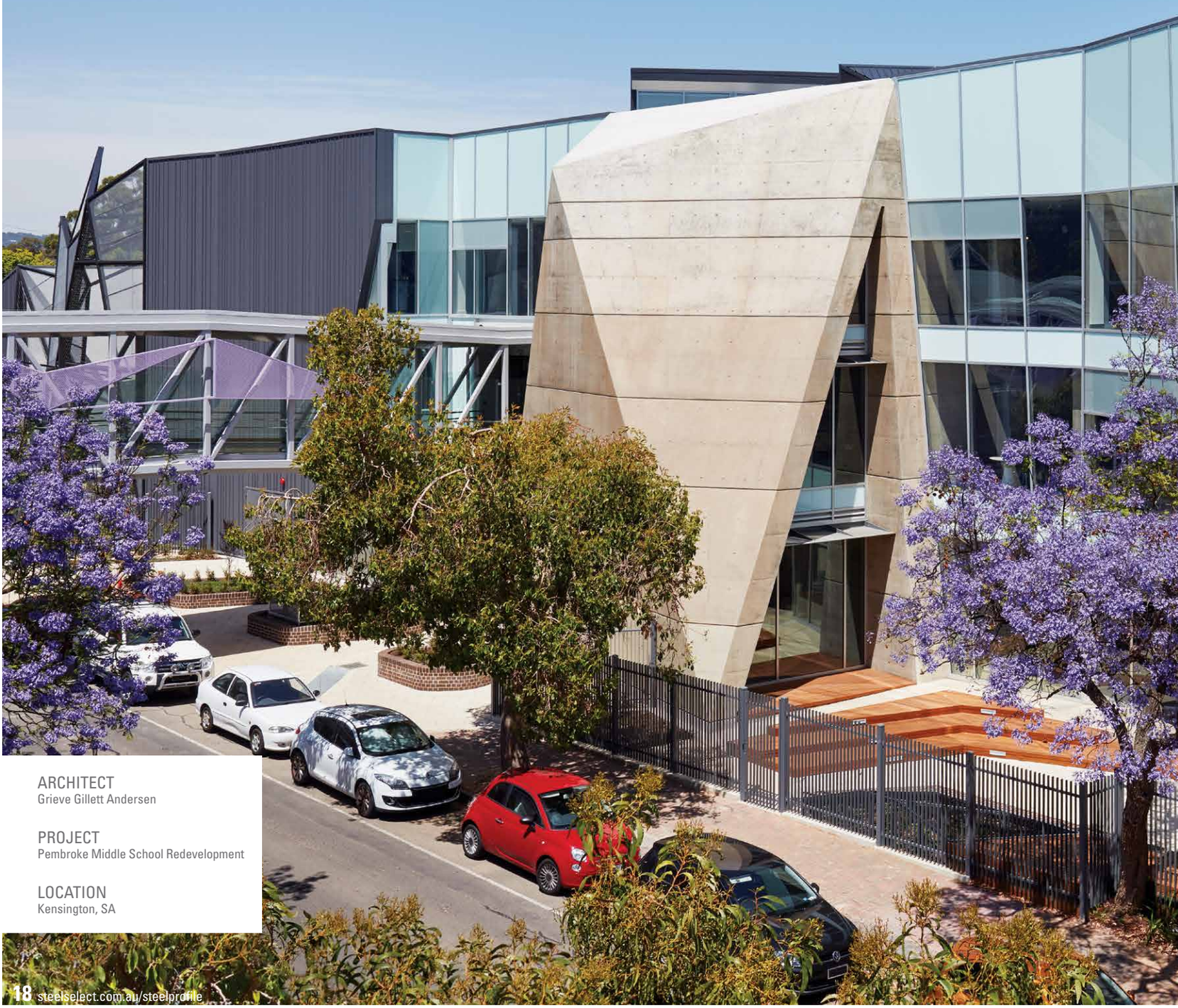
**Warranty subject to application and eligibility criteria. For full terms and conditions and to determine the eligibility of your project for warranty visit www.bluescopesteel.com.au/warranties or call BlueScope on 1800 064 384.*

ABOVE: The sleeping pods are clad in fibre cement panels with Blackbutt screening that complements the COLORBOND® steel in the colour Monument® presented on the underside of the roof.

OPPOSITE TOP: Balustrades fabricated from 50x10 steel flat bar and 50x25 RHS line the steel and timber walkway between the main structure of Crescent Lodge and its separate lounge, minimising the impact of guests on the environment.

PROJECT: Three Capes Walking Lodges **CLIENT:** Tasmanian Walking Company **ARCHITECT:** Andrew Burns Architecture **LEAD ARCHITECT:** Andrew Burns **TEAM:** Jordan Soriot, Casey Bryant, Alex Galego, Carter Hu, Noel Roche **PRINCIPAL STEEL COMPONENTS:** Roof sheeting: COLORBOND® steel in LYSAGHT CUSTOM ORB® ACCENT® 35 profile in the colour Monument®, 0.48mm BMT. Rainwater Tanks: AQUAPLATE® steel rainwater tanks with exterior pre-painted in the COLORBOND® steel colour Monument® 10x80kL tanks installed at Crescent Lodge and 13x100kL at Cape Pillar Lodge supplied by TankTec™. Balustrades: 50x10 steel flat bar stanchions with 50x25 RHS top rails. Sub Frame: 150x150x5.0 SHS Welded Frame, 125x75x5.0 RHS, Steel I-Beam. Sub Floor: SHS various sizes. Framing: Structural steel, various sizes. Primary Floor Beams: 250 Universal Beams (UB) 37.3. Roof struts: Structural steel Circular Hollow Sections (CHS) 42.4x2.6. Roof trusses: Structural steel with 10m span comprised of 125x9.0 SHS,125x6.0 SHS. Purlins: 75x5.0 Equal Angle (EA) **BUILDER & STEEL FABRICATOR:** AJR Construct **STEEL SUPPLIER:** Central Steel, Latrobe. **PROJECT MANAGER:** Kate Gooch (TWC) **STRUCTURAL ENGINEER:** SDA Structures **PLANNING/BUSHFIRE CONSULTANT:** Emma Riley and Associates **PLANNER:** ERA Planning and Environment **VIEWSHED ANALYSIS:** Another Perspective **GEOTECHNICAL ENGINEER/WASTEWATER:** Geo-Environmental Solutions **BUILDING SERVICES ENGINEER:** JHA **AWARDS:** 2020 Australian Institute of Architects National Architecture Awards, Commercial Architecture – Commendation; 2020 Australian Institute of Architects Tasmania Chapter Awards, The Colin Philp Award for Commercial Architecture.

AN INNOVATIVE LEARNING HUB FOR EDUCATIONAL EXCELLENCE



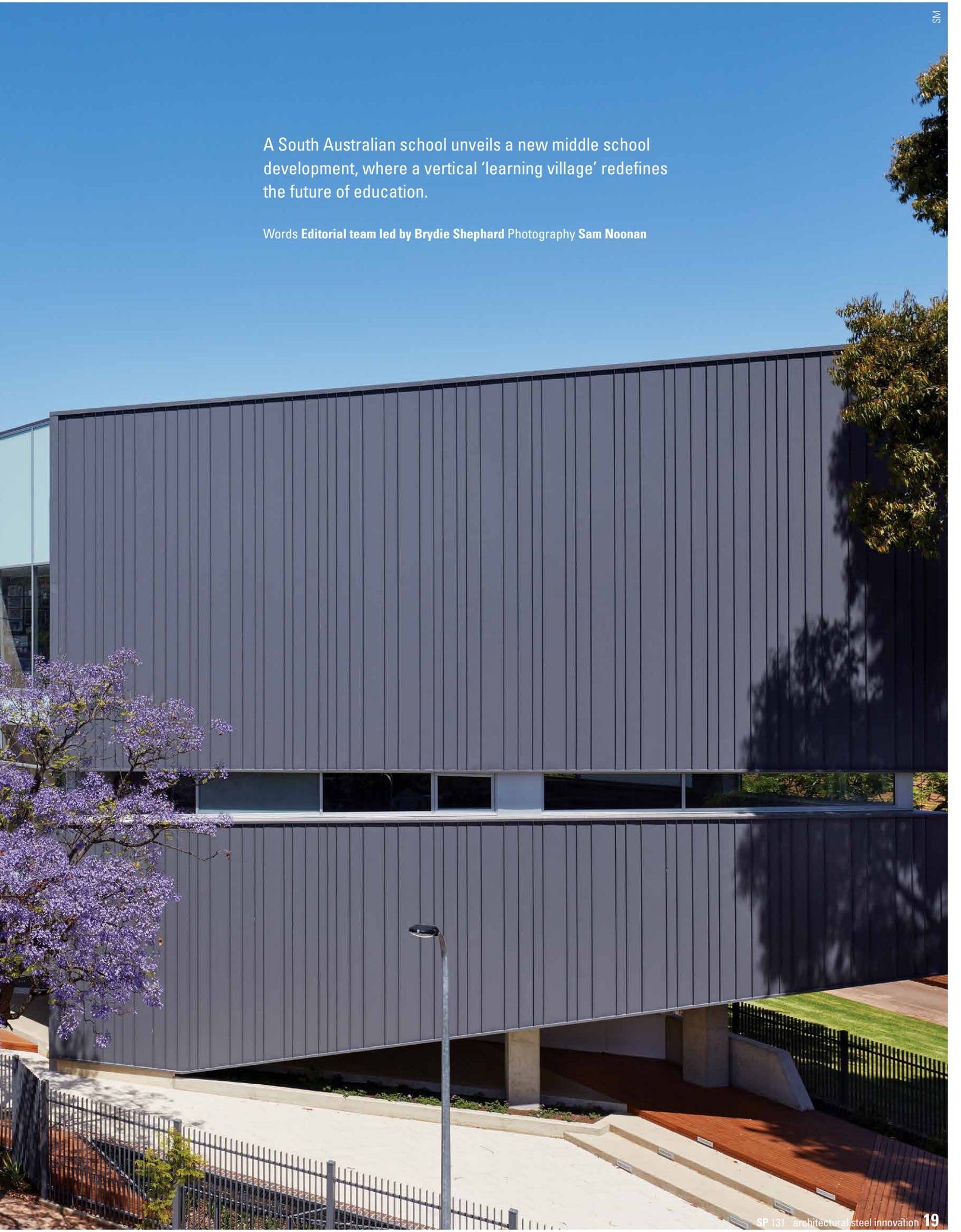
ARCHITECT
Grieve Gillett Andersen

PROJECT
Pembroke Middle School Redevelopment

LOCATION
Kensington, SA

A South Australian school unveils a new middle school development, where a vertical ‘learning village’ redefines the future of education.

Words **Editorial team led by Brydie Shephard** Photography **Sam Noonan**



In 2015, a triangular block of land hit the market in Adelaide, adjacent to the middle school campus of Pembroke – a leading co-educational, non-denominational day and boarding school. Located in the inner-city suburb of Kensington, the block had a complex footprint bordered by diagonal streets, within which Pembroke saw an opportunity to create an innovative learning hub for science, art, technology and cross-disciplinary learning.

At the core of the project's brief was a desire to build an educational setting that would use layout, materiality and technology to provide a foundation for success. "The atmosphere and qualities of the building needed to act as a catalyst for discussion, debate, enquiry and collaboration," notes Hannah Bone, Pembroke's Director of Advancement.

"Our brief included the mandate for flexible and static exhibition and enterprise spaces so that experts-in-residence can mentor, role model and challenge students and teachers about the reality of making ideas matter within and beyond the school setting," she explains. "We wanted the building to inspire future artists, engineers, scientists and artisans of all description – and for these disparate disciplines to collaborate together."

Comprising six specialist classrooms and 13 teaching spaces dedicated to science, technology and art, the new development was imagined as a place that would inspire the next generation of creatives and industry leaders, providing students with the space and facilities they need to engage proactively with their studies, co-curricular activities, the school community and society at large.

It was only appropriate then that the building's architecture strived for a similar goal. The key project team of architect Grieve Gillett Andersen (GGA), builder Sarah Constructions and cladding and roofing contractor SA Construct collaborated to produce a complex structure that worked within the site's parameters and was completed in a timeframe of just 24 months. Where traditional approaches to construction would ordinarily see a project of this size take up to 36 months to complete, innovation, pre-fabrication and on-site assembly allowed the team to cap both project duration and budget.

Connected to the original campus via an enclosed footbridge, the new development is a three-level angular structure that makes the most of the site's footprint. Constructed primarily from reinforced concrete, the substructure footing features a conventional raft slab with post-tensioned reinforced suspended decks.

From the street, a striking external façade of steel cladding breaks up the site's concrete and glass form, with variable pan widths creating a welcoming exterior for the school's community. Inside, the triangular block is broken down into a series of multi-storey smaller buildings that are grouped around a central atrium which doubles as an exhibition space and concert hall.

Here, polished concrete floors are softened with tallowwood timber floors, Victorian ash stairs and balustrades, steel balustrades and white-washed timber perforated acoustic wall panels.

Materiality is featured as a central component of the build, with large volumes of steel, concrete and glass coming together in a juxtaposition of tones and textures. These material choices, and the sensory interplay between them, are designed to distinguish the new development from the school's existing heritage buildings and offer students extraordinary spaces to support and encourage individuality, creativity and curiosity.

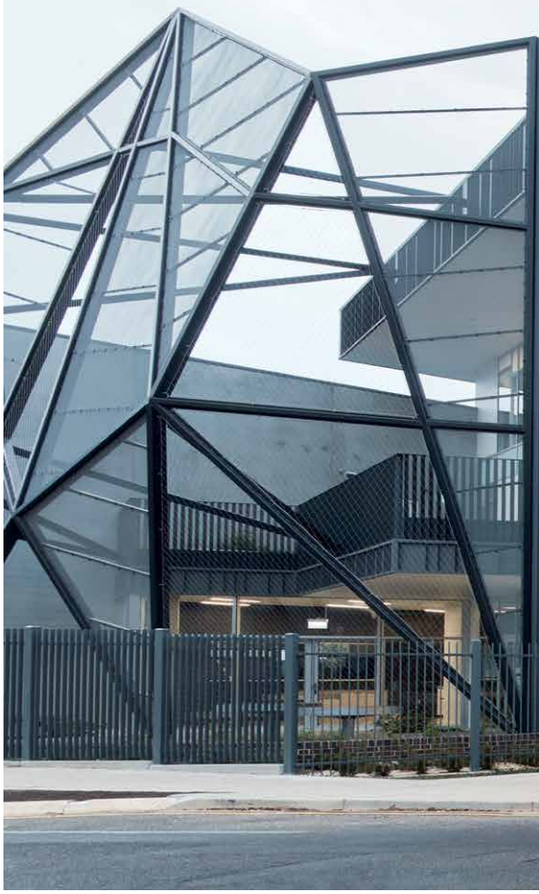
For the building's façade, 2,020m^2 of Fielders Finesse® Prominence™ wall cladding made from COLORBOND® steel Matt in the colour Basalt® works to add depth and softness to the building's monolithic concrete elements and highlight the intricate angles of the architecture.

Comprising approximately 1,600 pieces delivered in 22 sections, the panels were produced using Computer Aided Design (CAD) elevations, where different width sheets were rolled out before being hand-cut into their final shapes.

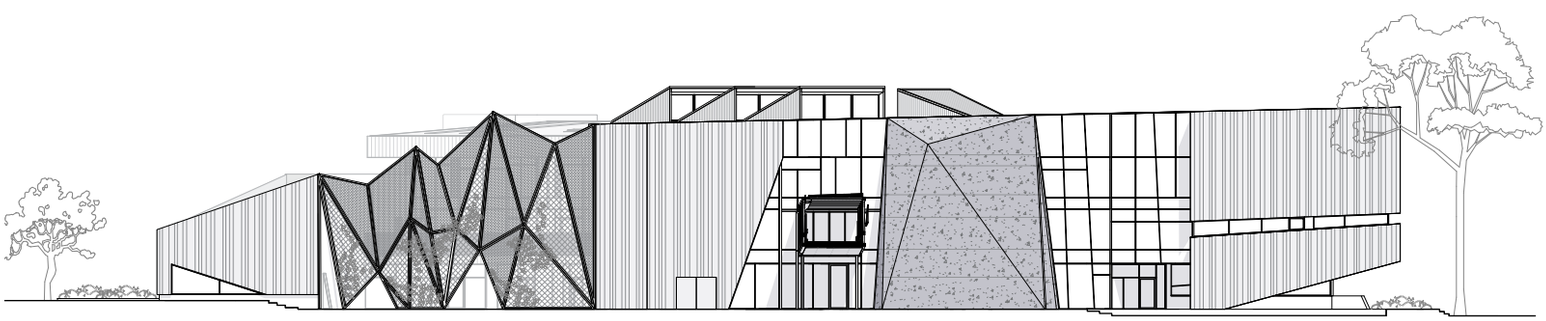
The variations in pan widths bring a custom design element to the building, with the irregularity of the intervals providing a depth of texture that elevates the overall structure and brings a personality to the otherwise imposing façade.

Throughout the cladding process, the customisation from Fielders allowed for installation to be quick and easy, providing a durable cladding solution that could be produced and fit within the project's timeline.

The Fielders Finesse® Prominence™ wall cladding works to soften the angular concrete, forming part of a key material palette of steel, concrete and glass.



RIGHT: A footbridge comprising of steel, concrete, perforated aluminium screens, glass and CFC sheeting connects both sites together, allowing for simple, all-weather access between the existing building and the new development.



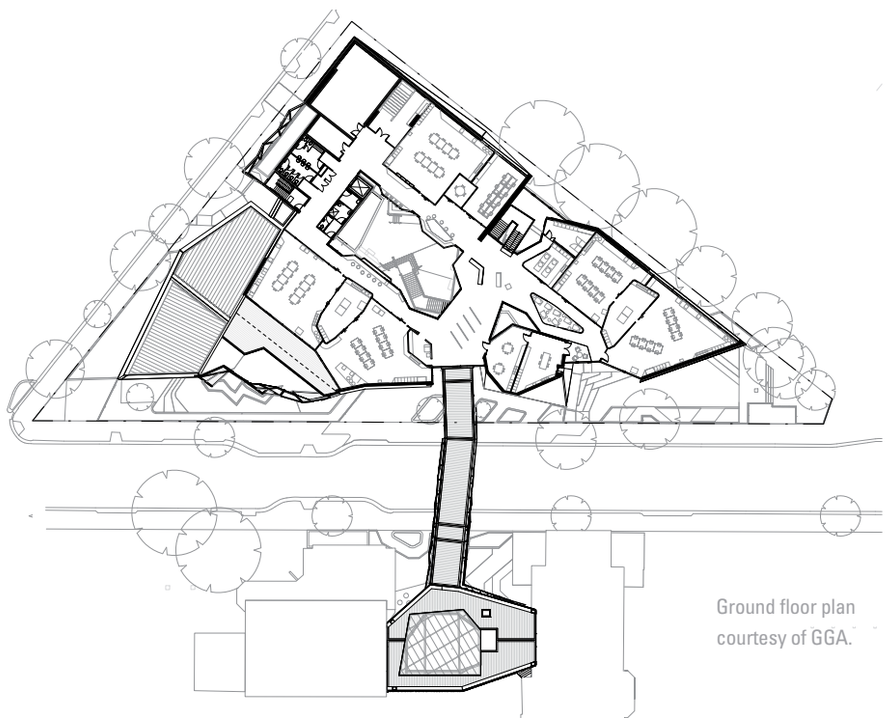
East elevation courtesy of GGA.

SM

SM

ABOVE: Inside the new campus, a ventilated atrium resembles a ‘town square’, where breakout spaces allow for staff and students to mingle and interact as they navigate between the classrooms and activated learning areas that line the building’s perimeter. OPPOSITE: The building’s triangular shapes reflect the angles of the site, with cladding of Fielders Finesse® Prominence™ made from COLORBOND® steel Matt in the colour Basalt® working to accentuate the structure’s form.

“Steel cladding looks great across large areas, has design flexibility, can be easily customised and is low maintenance.”



Ground floor plan courtesy of GGA.

"Steel cladding looks great across large areas, has design flexibility, can be easily customised and is low maintenance," says Dimitty Andersen, director of GGA. "We detailed the building's cladding in a variable width. This adds a custom design element, enhanced by the matt finish for a softer, more high-end look reminiscent of zinc. In addition, the cladding has a matt finish that gives a soft lustre and depth of colour."

The cladding also provided an important architectural reference to the school's progressive ethos, where the tone, texture and materiality draws from typologies of industrial sheds as a nod to the process of making and creation that defines both construction process and curriculum.

The typical low roof pitch of sheds and industrial buildings is also brought into play, where a parapet assists in concealing any visible pitch, giving the appearance of a flat roof. Here, Fielders KingKlip® 700 made from COLORBOND® steel in the colour Monument® provided a flexible roofing solution that fit the building's triangulated shape while also providing watertightness to the entire structure.

Setting off the façade is a statement concrete shard, where 15-metre, vertical raked angle walls come together to form a series of triangulated shapes.

Unique to the South Australian construction community, the shard is an earthquake-resistant structure, which provides additional lateral stability in the event of seismic movement, while also providing a key architectural statement.

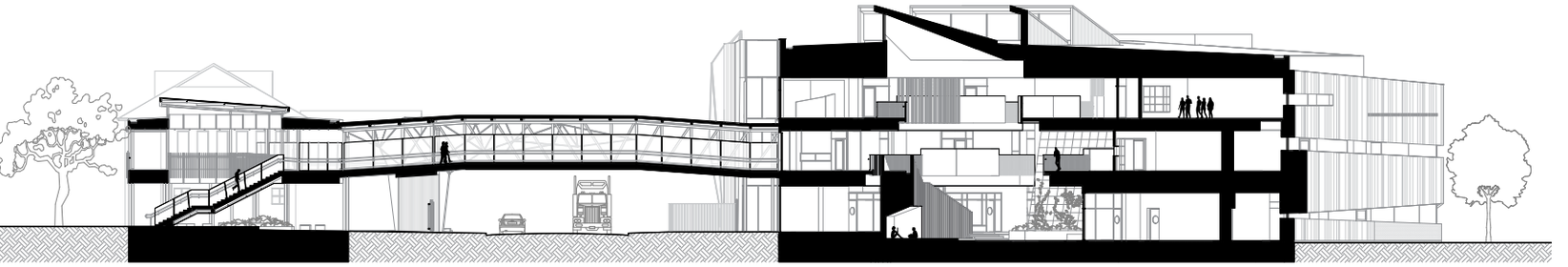
Another major deliverable was the 26.2m covered glass footbridge, which stretches across Shipsters Road to provide safe and seamless access between the new development and the existing campus.

With a mind to keep student and community disruption to a minimum, the bridge was pre-fabricated offsite using steel mostly in Square Hollow Sections (SHS) by pre-fabricated structure designers and manufacturers Specialised Solutions, who worked with GGA, Sarah Constructions and structural and civil engineers Combe Pearson Reynolds to design and manufacture a bridging solution that would require minimal work onsite.

The structure of the bridge is designed in steel and concrete, and is enclosed by perforated aluminium screens, compressed fibre cement (CFC) sheeting and glazing, to ensure students can transition between the new development and the existing campus whatever the weather.

"We used steel so we could pre-fabricate the bridge off-site and install it in a single lift," says Ainsley Knights, project manager at Specialised Solutions. "Alternative products may have required us to build on-site which would have eaten into the project's timeline and impacted traffic and pedestrian access over a significantly longer period." Pre-fabrication also allowed greater quality control, with milestone factory visits allowing all consulting parties to ensure relevant expectations were being met.

Staff and students access the bridge via a main thoroughfare on the original campus. Here, shelter is provided by an external roof system consisting



South facing section courtesy of GGA.

LEFT: Encouraging staff and students to teach and learn outdoors, the transition from indoor to out is seamless and hyper-accessible, with multiple areas that open out from interior spaces.

BELOW: Students in the existing campus access the new development via a staircase which connects to the covered footbridge. This ensures access is possible in any weather.

OPPOSITE: An exterior mesh of steel beams reflects the angular site, while also providing students with screening from the morning sun.

of Rectangular Hollow Sections (RHS) supporting translucent roofing panels.

Inside the campus, classrooms and workshops are arranged around a ventilated central atrium, which draws on the concept of a 'learning village' to create a pseudo town square. In the atrium, students and staff are able to work and connect in breakout spaces, view displayed artwork and attend theatre performances and orchestra rehearsals.

The atrium is also the key connection point between the three educational 'neighbourhoods' of technology, science and art, which each have a designated floor in the campus.

Large volumes of internal glazing draw natural light through the building and increase interaction between the classrooms, laboratories, workshops and art studios that line the perimeter of each level, while industry-occupied enterprise spaces and an artist-in-residence studio provide the students with 'real world' business exposure.

The atrium and foyer also feature beds of indoor plants, ensuring the campus has a connection to the outdoors.

"All the design decisions made were focused through the lens of 'building as teacher,'" says GGA's Dimitty Andersen. Indeed, the building is a

living educational space, with exposed services putting the inner workings of the building on show.

"Hopefully there will be spin off," Andersen says, "to inform and inspire the next generation of builders, designers and innovators."

Complementing these interior spaces is a dedicated footprint of outdoor zones, totaling 778m^2. Encouraging staff and students to teach and learn outdoors, the transition from indoor to out is kept seamless and hyper-accessible, with multiple areas that open out from interior spaces, including a large biodeck on level one of the campus.

Situated next to the science laboratories, the deck allows for lesson plans to be devised with outside interaction in mind, offering real world applications for studies of the natural sciences.

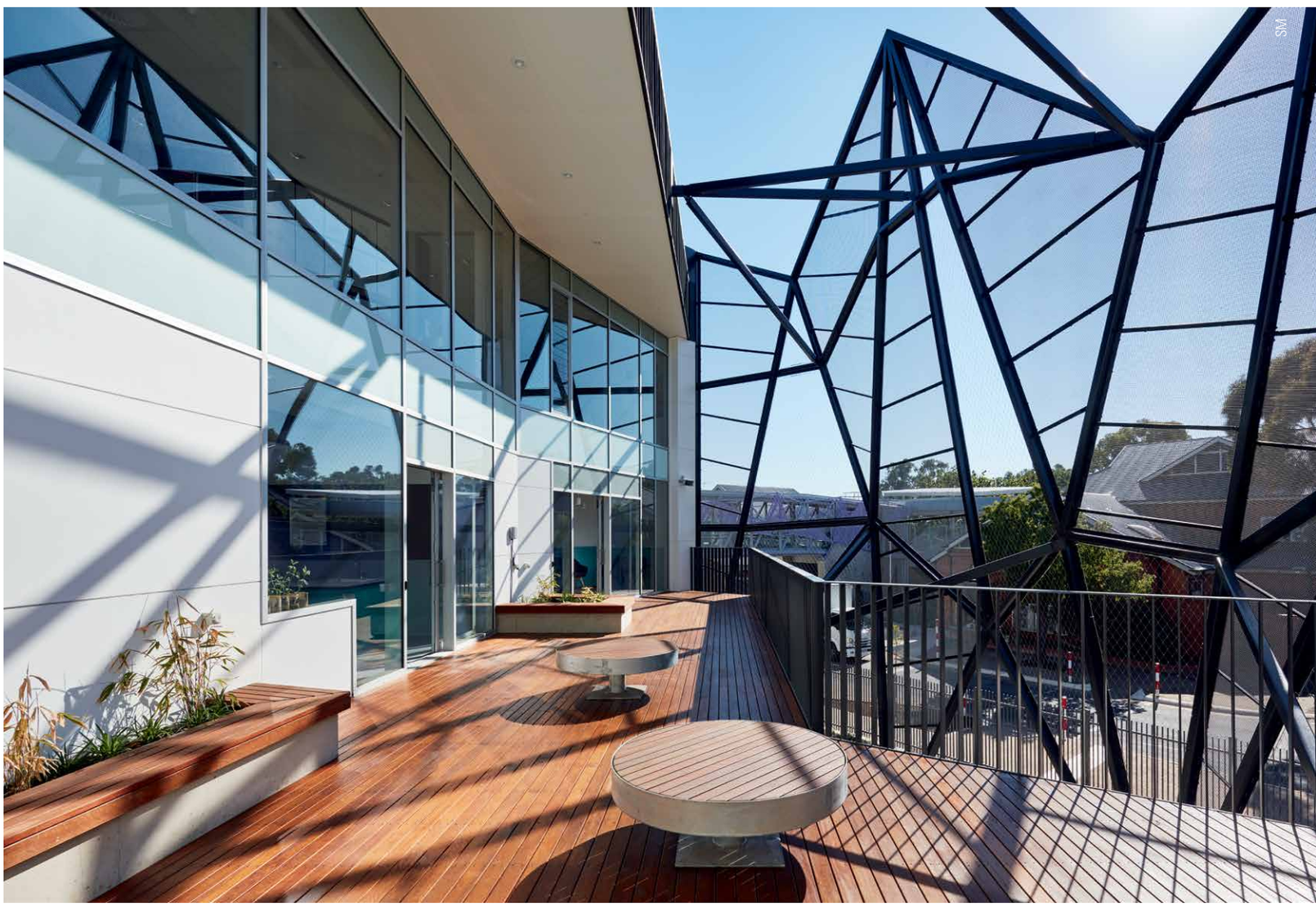
Bordering the deck is an intricate "spider web" of steel beams onto which woven wire screening mesh from expanded and perforated metal from wire mesh fabricator Locker Group has been applied. This structure provides protection from the early morning sun, acts as a planting screen and provides three-dimensional dynamism to the overall building.

It is this dynamism that truly makes the building, where materiality allowed the project team to lean into the site's restrictions and turn them into features, creating a building that is not restricted but rather is empowered by its constraints.

The result is a campus that looks alive, using shape and texture to manipulate materials and light so they appear as if they are moving, creating what Andersen describes as a "building of energy".

Since the project's completion in 2019, it has been recognised with a number of awards from the Australian Institute of Architect's South Australian Chapter, including the COLORBOND® Award for Steel Architecture, the Dr. John Mayfield Award for Educational Architecture and a commendation for Interior Architecture. Perhaps more importantly however, is how the building has been received by its key stakeholders: the students.

To this, Andersen recounts a site inspection at the project's completion, where she saw an art class depicting versions of the new campus in 2D and 3D artworks: "That was very emotional for me," she said, "because that very thing we hoped would occur, did. This was an appreciation of deeper learning right before you. That was fantastic and very gratifying."



PROJECT: Pembroke Middle School **CLIENT:** Pembroke School **ARCHITECT:** Grieve Gillett Andersen **PRINCIPAL STEEL COMPONENTS:** Wall cladding: Fielders Finesse® Prominence™ in COLORBOND® steel Matt in the colour Basalt® in thickness of 0.48 BMT with rib 25mm. Roofing: Fielders KingKlip® 700 in COLORBOND® steel in the colour Monument®. Purlins and girts: LYSAGHT® from GALVASPAN® steel. Balustrades: mild steel **STRUCTURAL STEEL COMPONENTS:** Universal Beams (UB), Parallel Flange Channels (PFC), Universal Columns (UC), Rectangular Hollow Sections (RHS), SHS, Equal Angles (EA), Unequal Angles (UA) **BRIDGE COMPONENTS:** Mild steel in SHS, Aluminium beams, CFC sheeting **ADDITIONAL MATERIALS:** Aluminium windows from Architectural Window Systems (AWS); Feature external screening: Woven Wire Screen Mesh from Locker Group; External window mesh: Perforated Metal Sheeting from Locker Group; Danpalon® Microcell Panels in Softlite Ice from Danpal®. **BUILDER:** Sarah Constructions **ROOFING AND CLADDING:** SA Construct **MAIN BUILDING STEEL FABRICATOR:** Advanced Steel Fabrication **BRIDGE STEEL FABRICATOR:** Specialised Solutions **STRUCTURAL ENGINEERS:** CPR Engineers PROJECT TIMEFRAME: Completed October 2019 in a timeframe of 24 months **AWARDS:** 2020 Australian Institute of Architects South Australian Chapter, COLORBOND® Award for Steel Architecture; 2020 Australian Institute of Architects South Australian Chapter, The Dr. John Mayfield Award for Educational Architecture; 2020 Australian Institute of Architects South Australian Chapter, Interior Architecture – Commendation; 2020 Australian Institute of Building Professional Excellence in Building Awards South Australian Chapter, Commercial Construction $1 Million to $25 Million - High Commendation. **TOTAL PROJECT COST:** $24 Million.

ARCHITECT
Cumulus Studio

PROJECT
Symmons Plains Homestead

LOCATION
Perth, Tasmania

A MODERN MARRIAGE

A gracious Georgian homestead has been modernised and its outbuildings refurbished and connected to the main house with COLORBOND® steel, ZINC HI-TEN® steel and TRU-SPEC® steel creating a harmonious marriage of old and new structures.

Words **Editorial team led by Brydie Shephard** Photography **Anjie Blair**

Georgian architecture, named for its prominence in Britain during the consecutive reigns of George I, II, III and IV, is defined by its symmetry and balance.

Drawn from the classical architectural vernaculars of Greece and Rome, Georgian buildings of the 18th century were all about proportion, with windows placed on grids and functional parts of homes relegated to the sides or in separate out-buildings.

Ornament, while encouraged inside the home, was largely absent from a building's façade, with a home's size and surrounding gardens a preferred way to communicate grandiosity.

In Australia, British colonialists used Georgian architecture as a key influence through to the 19th century. Tasmania, with a prosperous local economy driven by tin and ship building industries and a vibrant agriculture sector, attracted migrants to its shores, bringing with them a predisposition towards Georgian-style villas set in appropriately designed landscapes. A number of these can be found in the Launceston region, including the Symmons Plains Homestead near the town of Perth.

The 808-hectare site had been a farming property since the early 1820s when Reverend John Arndell Youl was granted the property. In 1839, the homestead was built: a modestly-scaled Georgian villa with typically Palladian landscaping running down to the South Esk River.

Over the coming decades, seven generations of Youls would come to farm the estate, ultimately adding a tennis court, a swimming pool, an airstrip and – and probably best known by Tasmanians – the Symmons Plains Raceway for V8 Supercars, an initiative of a later John Youl, himself a racing driver.

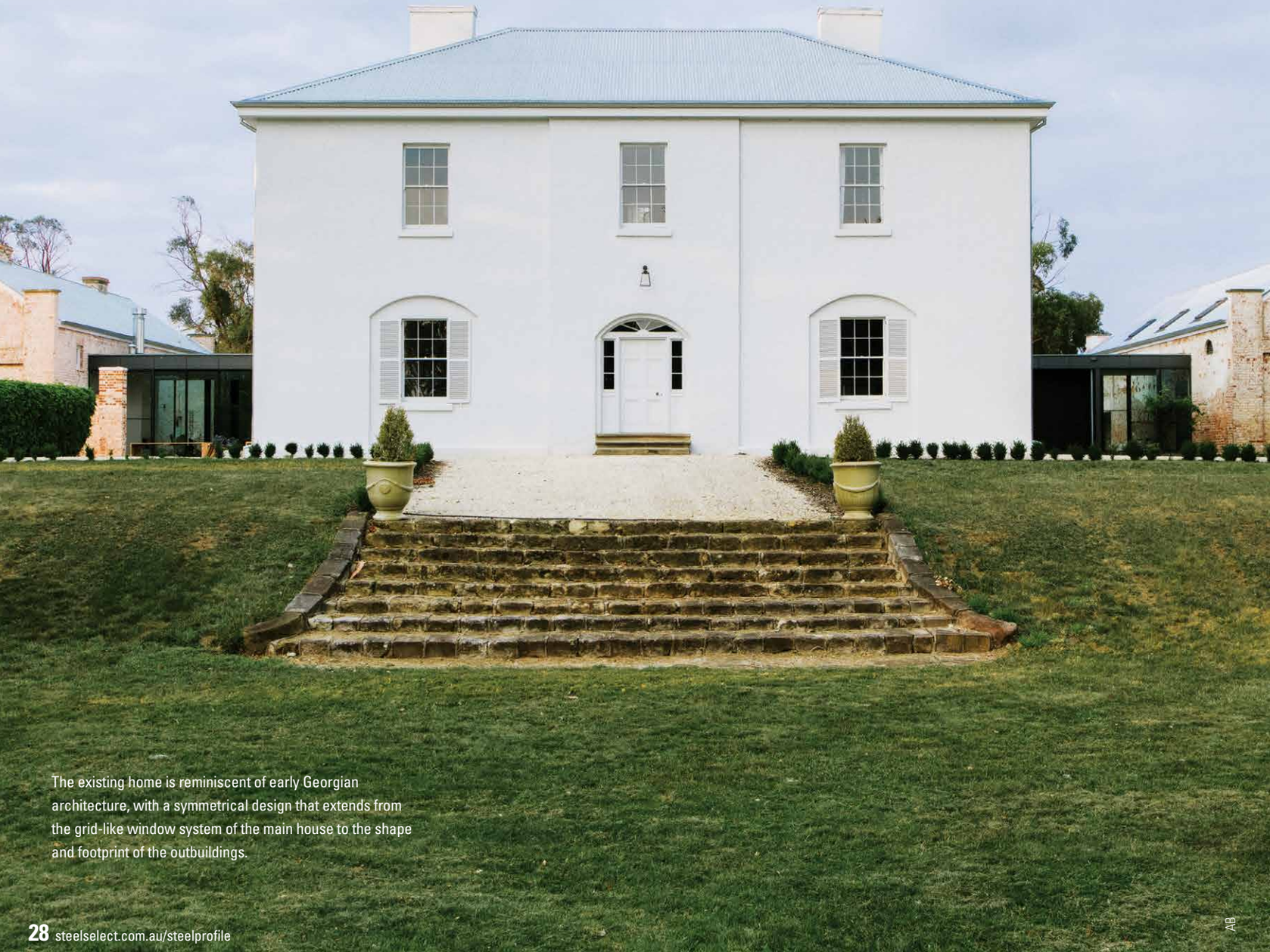
The property was sold in 2011 to Clovelly Tasmania, a local farming syndicate managed by a worldwide corporation. The new owners recognised the need to restore and refurbish the homestead, wanting to preserve the stories and history imbued by Youl and the seven generations of his family who called Symmons Plains their home.

At the same time, they wanted to introduce modern amenities, while respecting the heritage of the homestead and its two out-buildings – a granary and stables which were in poor condition – which they envisioned as new accommodation for visiting business associates from interstate and overseas.

The clients commissioned Cumulus Studio, an award-winning architecture and interior design practice with offices in Launceston, Hobart, Melbourne and Adelaide.

With a collaborative, inter-studio ethos and a number of local, adaptive-reuse projects in their portfolio, Cumulus approached the project with experience and enthusiasm.

On their first site visit, the team – led by architect Todd Henderson – immersed themselves in the existing structure, looking under existing floorboards and climbing through the crumbling outbuildings to get a proper feel for the site. It was this hands-on approach that appealed to the clients, solidifying Cumulus' commission.



The existing home is reminiscent of early Georgian architecture, with a symmetrical design that extends from the grid-like window system of the main house to the shape and footprint of the outbuildings.

AIB

ABOVE: Inside the main living area in the new addition, spaces are kept open with custom fabricated slender steel mullions elegantly supporting the lightweight roof structure without the need for intrusive internal structural columns. BELOW: The rear wing of the existing Georgian building and its two symmetrical Georgian brick outbuildings have been connected and consolidated by a new lightweight glazed link custom framed with mullions fabricated from RHS.

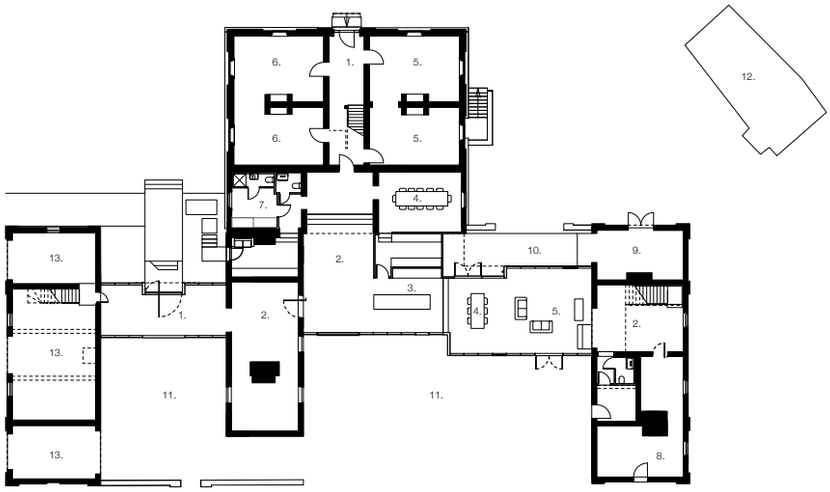
"The new owners recognised the need to restore and refurbish the homestead, wanting to preserve the stories and history imbued by Youl and the seven generations of his family who called Symmons Plains their home."

Important to the brief was to connect the two outbuildings to the rear wing of the main building, creating a coherent cluster of useable spaces for a family of seven, plus guests.

"The existing Georgian building was austere and relatively featureless," says Todd. "It was quite solid with only small openings, like a huge block. So, the idea was to do the antithesis of that with a glazed link so that when you are in the interstitial spaces you get a very different feeling."

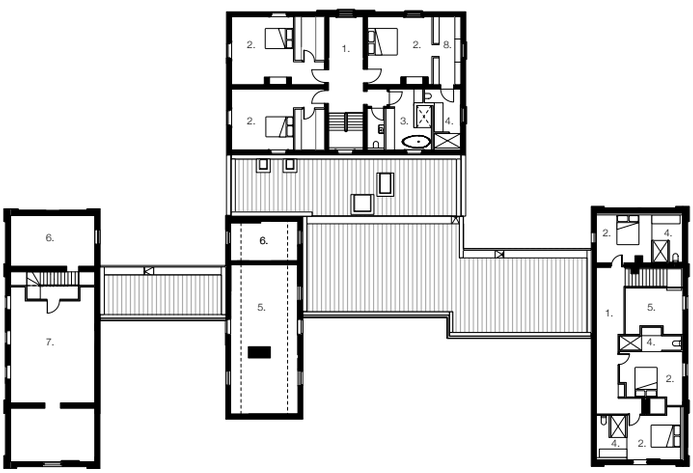
Todd is happy to acknowledge the inspiration of the great Italian architect, Carlo Scarpa. Scarpa was famous for his interventions into existing, historical buildings and marrying the basic architecture with hand-crafted details. Like Scarpa's best-known works, such the Museo Castelvecchio in Verona and the garden of the Fondazione Querini Stampalia in Venice, Symmons Plains was a heritage project which aimed to restore the original building, but at the same time transform it into a functional, modern home. And, as with Scarpa, the idea was to form a true marriage of old and new where both had their separate identities, but worked harmoniously together.

It was a four-year project which began with necessary remedial work to the base building with specialist stonemasons, expatriates from Britain, repairing the foundations. The structural integrity of the building had to be restored (having been damaged by tree roots), damp-proof courses put in, brick walls re-built and some poor additions



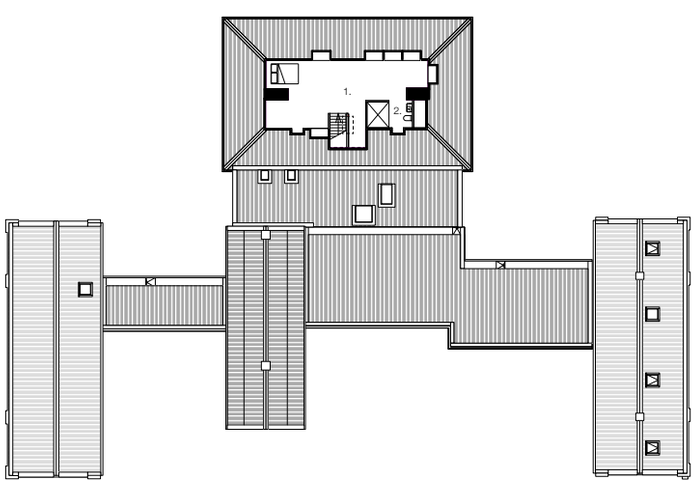
GROUND FLOOR

1. Entry
2. Gallery
3. Kitchen
4. Dining
5. Living
6. Office
7. Laundry/Mudroom
8. Pub
9. Pool house
10. Terrace
11. Courtyard
12. Pool
13. Garage



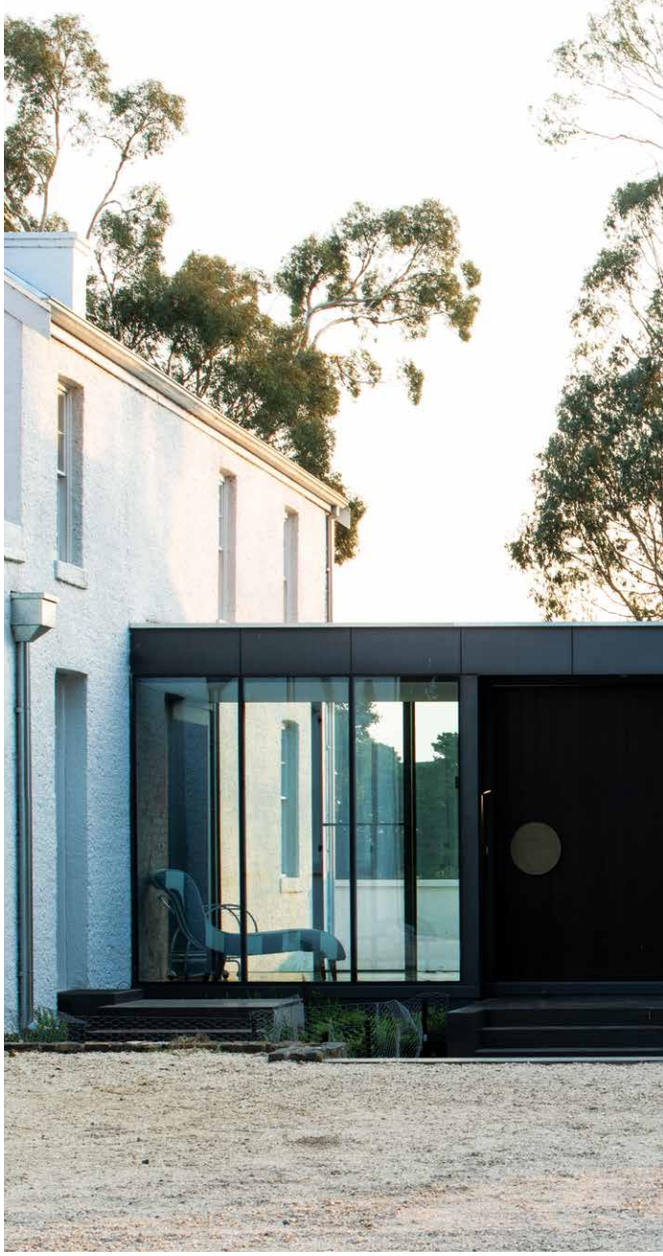
FIRST FLOOR

1. Gallery
2. Bedroom
3. Bathroom
4. Ensuite
5. Void
6. Storage
7. Rumpus
8. Robe



SECOND FLOOR

1. Bedroom
2. En-suite



AB

removed, along with the 1960s kitchen. “We had to peel back the things added over time,” says Todd, “and get it back to what it originally was.”

Inside, the history of the building is celebrated by the exposed brick walls and joists. But what really ignites the character and history of the building are the new interventions – the imaginative use of steel in two lightweight, glazed ‘tubes’ which appear as a singular connection that brings all the elements of the house together.

“All the existing building is brick and timber,” says Todd. “So, we wanted to do something quite different structurally and use a different aesthetic to what was there. The client was also very keen not to have any aluminium doors or windows. They wanted it to feel as though it was truly bespoke.”

The Cumulus strategy was that any new elements in the house had to have a connection to steel.

This formed an integral part of the architectural narrative: the coming together of old and new, where the “old” was identified by original materials with aged patinas, and the “new” with sleek steel in dark colourways.

This is clear from the outside where the glazed ‘tube’ extrudes on either side of the main structure and where all of the windows and spacings are lined with slender steel mullions in Murobond® Bridge Paint in the colour Carbon, spaced at equal distances.

Fabricated by Crisp Bros. & Haywards from rectangular hollow sections Rectangular Hollow Sections (RHS) of 75mm x 50mm x 3mm (manufactured by Orrcon Steel from BlueScope cold rolled steel coil), the mullions work alongside double-glazed glass to create a high-performance glazed solution with limited opportunities for thermal bridging. Importantly, the symmetrical spacing of the mullions forms a grid which replicates the orderly character of the original Georgian building.

From the façade, the transition between new and old is made explicit with the juxtaposition of steel and brick. This differentiation, set up as one first sees the home, is carried through to the interiors, with steel used again and again to identify any modern additions.

From staircases, to shelving: the sleek, dark steel is set against the original materiality of the building as its antithesis, its visual contrast drawing attention to the home’s character as it becomes a tangible synonym for the “new”.

Beyond building a visual narrative of the home’s refurbishment, steel was also used for its ability to provide a thin profile that could act as key structural features.

In the glazed tubes, the slender steel window mullions support the lightweight roof structure without the need for intrusive internal structural columns.

Accordingly, the living and dining area inside the tube is kept open and seamless, with uninterrupted views available through the entire tube. Hence, the steel mullions are both structural and aesthetic.

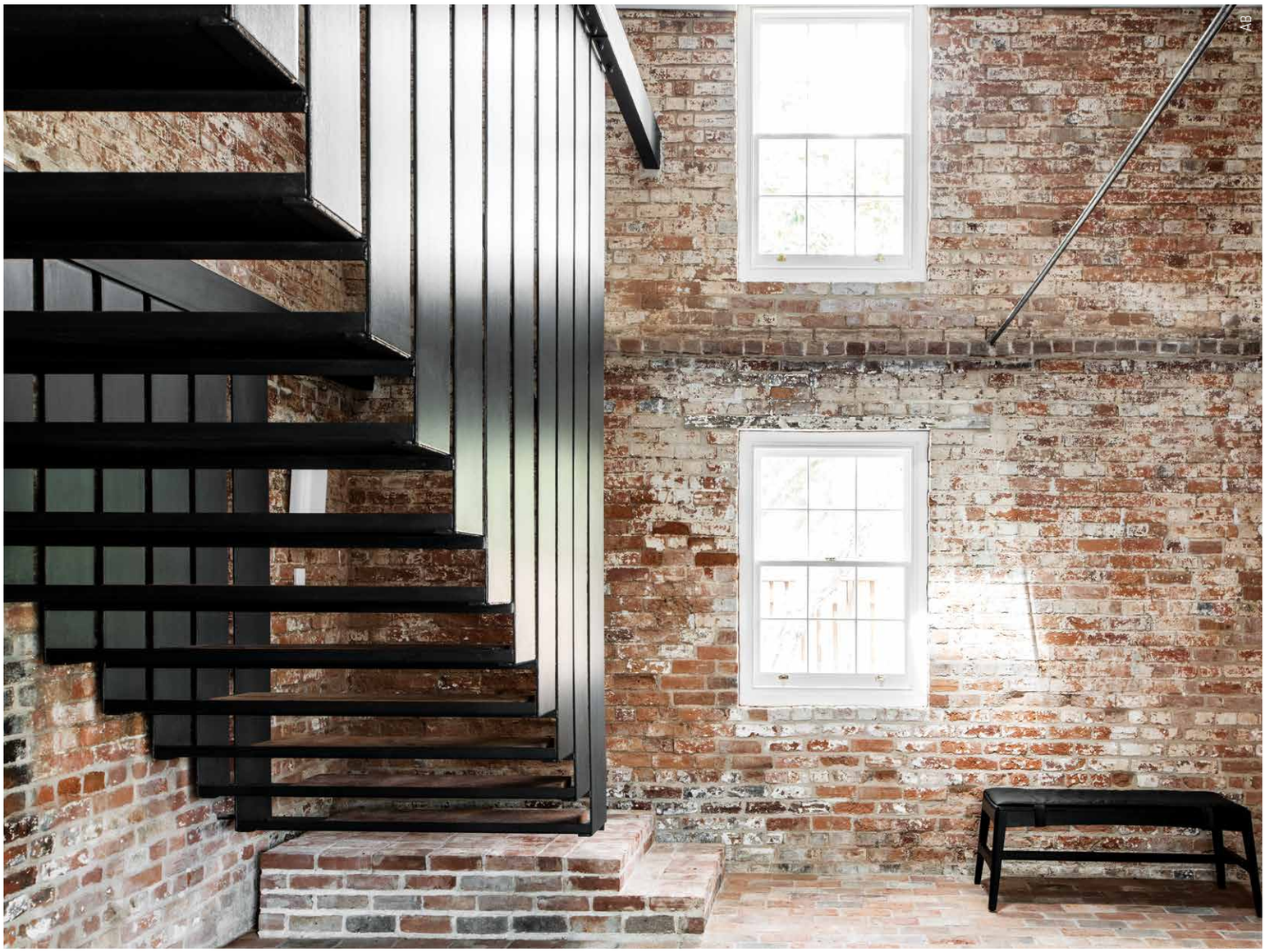
In addition to indicating new additions to the building, the steel choices also allowed for the existing structures to take precedence in the overall design narrative.

ABOVE: Mullions line the new link in equal intervals, allowing for a thin structure that appears light and unobtrusive, an elegant visual metaphor for the shift between old and new.

BELOW AND RIGHT: Before and after – the outbuildings were restored to become functional extensions to the main house. Pictured here are the original stables, which were transformed to house garage space on the ground floor, with a rumpus room and storage space above.

Image courtesy of Cumulus Studio

AB



ABOVE: In the old granary building, a floating steel staircase crafted from TRU-SPEC® steel flat plate is juxtaposed against the exposed brick of the original space, a reference to the staircase at the Museo Castelvecchio. OPPOSITE PAGE LEFT: Where new interior openings have been created, RHS, equal angles and pivot doors have been used to provide visual transitions between old and new.

While the traditional Georgian building uses size to express grandeur, the new spaces employ walls of double-glazed glass and a low roofing profile to be less conspicuous on the site.

Where the homestead features a hipped roof, the glazed tubes have a virtually imperceptible roofline, where a low pitch is finished with COLORBOND® steel in the LYSAGHT KLIP-LOK CLASSIC® 700 profile in the colour Monument®.

With good spanning capacity and no need for exposed fasteners, the roofline is kept discreet, downplaying the new interventions and keeping the homestead's heritage buildings as the main features of the project.

Scarpa typically exposed the history of the building then juxtaposed it against carefully crafted contemporary interventions, or else he boldly contrasted one material against another, as in the steel staircase at the Museo Castelvecchio which floats against a wall of exposed brick.

Cumulus has adopted a similar strategy with the interiors at Symmons Plains. And once again an imaginative use of steel is the linking theme which creates a sense of unity throughout.

This 'steel solution' came about as a result of extensive collaboration, not to mention Todd's own background. "My dad was a boilermaker and is now a steel estimator and I spent my younger years in the shed welding and using steel in an interesting way."

This provided the backdrop to working with "a couple of the guys" at the steel fabricator, Crisp Bros. & Haywards in Launceston to see how it could all come together with the glass.

"We worked up one-to-one samples," says Todd. "It was quite good to work with the people who would be putting it together."

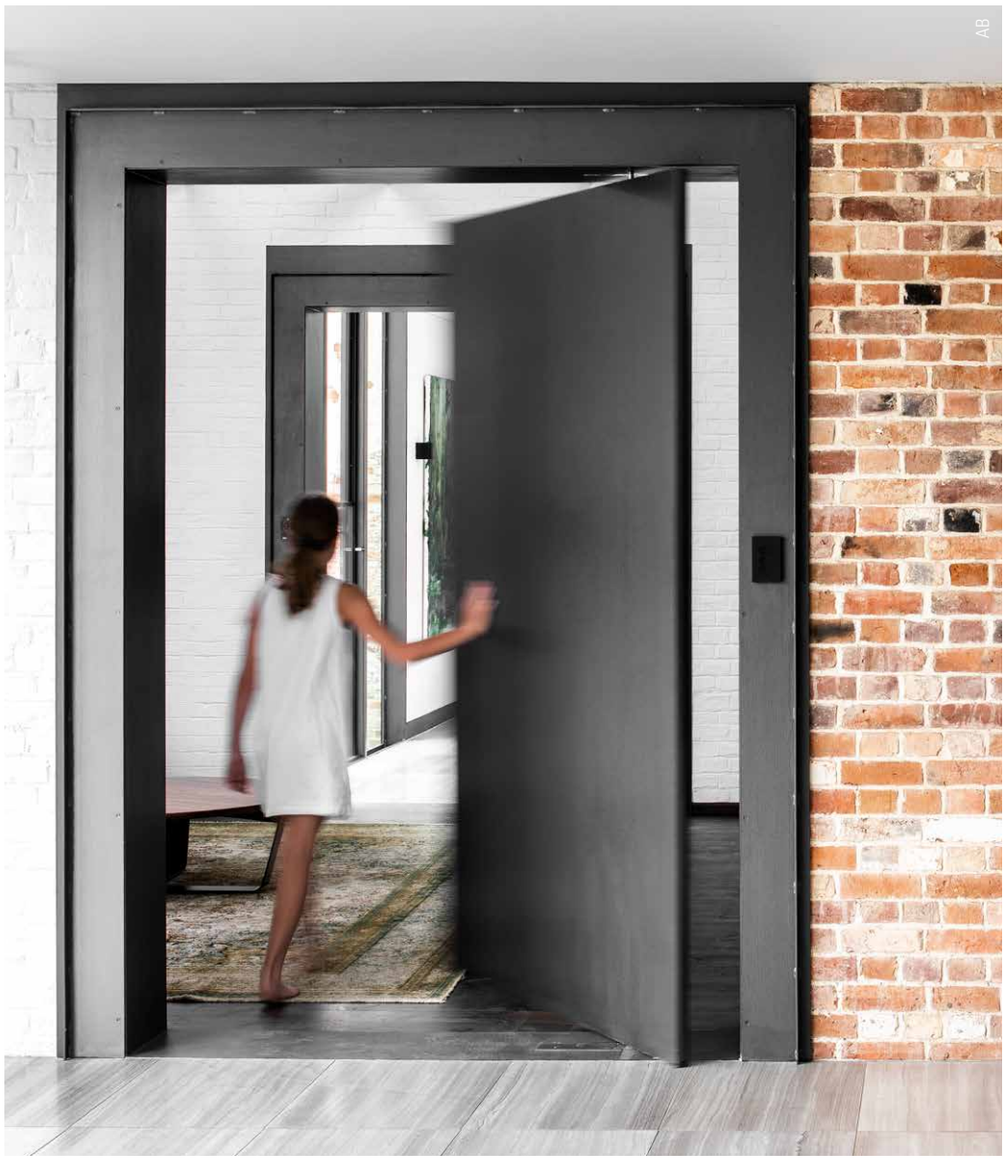
Interior thresholds, where new openings have been created, have a steel surround fabricated from RHS and Equal Angle (EA) – which signals that it is a new opening as opposed to an existing one. With the pivot doors, these surrounds act like reveals.

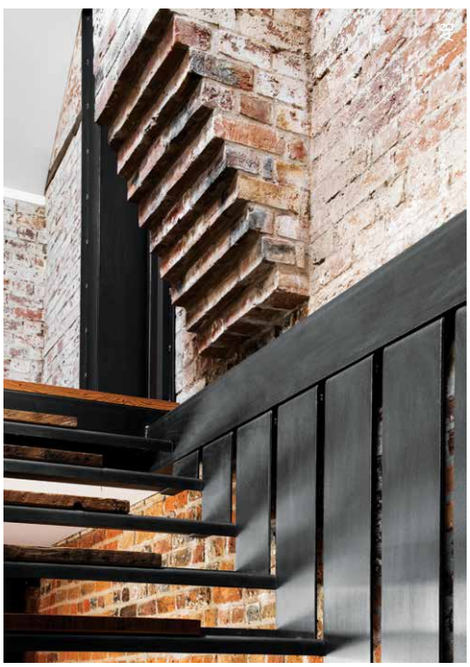
In the new kitchen space, located in the glazed addition, stainless steel has been used to tie interior and exterior together, with the material featuring on the benchtops and in the recessed bench space.

The showpieces, however, are the floating steel stairways in the home's gallery and rumpus room (previously the granary and stables respectively). Fabricated by Crisp Bros. & Haywards from TRU-SPEC® steel flat plate, the two staircases are the most overt Scarpa references in the whole project.

In both cases, brickwork and timber are set off with bespoke steel detailing, where the flatness and smooth finish of the TRU-SPEC® steel contrasts against the aged textures of the original bricks.

The client had wanted floating stairs right from the beginning. The architects concurred and





TOP RIGHT: The original south-facing kitchen (once part of the servant quarters) has been relocated to the new glazed addition and reimagined as a family gathering area. Steel has been crafted into this space, featuring on the benchtop and in the recessed bench space. BOTTOM RIGHT: Steel sets off a material interplay between the old and new, with TRU-SPEC® steel flat plate floating against original brickwork and finished with salvaged timber treads.

designed two stair structures, both hung from Parallel Flange Channels (PFC).

At the foot of the stairs in the gallery, bricks recycled from on-site demolition form an approach to the stairway, while the treads are timber salvaged from the previous, rotted, flooring.

Balustrading up the stairs and on the landing is crafted from RHS, EA and TRU-SPEC® steel flat plate. The ground floor now constitutes the social spaces of the house.

The client's offices and formal lounge areas occupy the main building while the kitchen, dining and informal living spaces have been re-located to the new insertions where they can enjoy ample natural light and clear connections with newly extended outdoor social spaces, the terrace, pool and rear courtyards. These insertions, creating a link to the outbuildings, have allowed the stables and granary to be transformed into bedroom suites, garage space and an oversized rumpus room, completing the transition from austere Georgian homestead to refurbished family home.

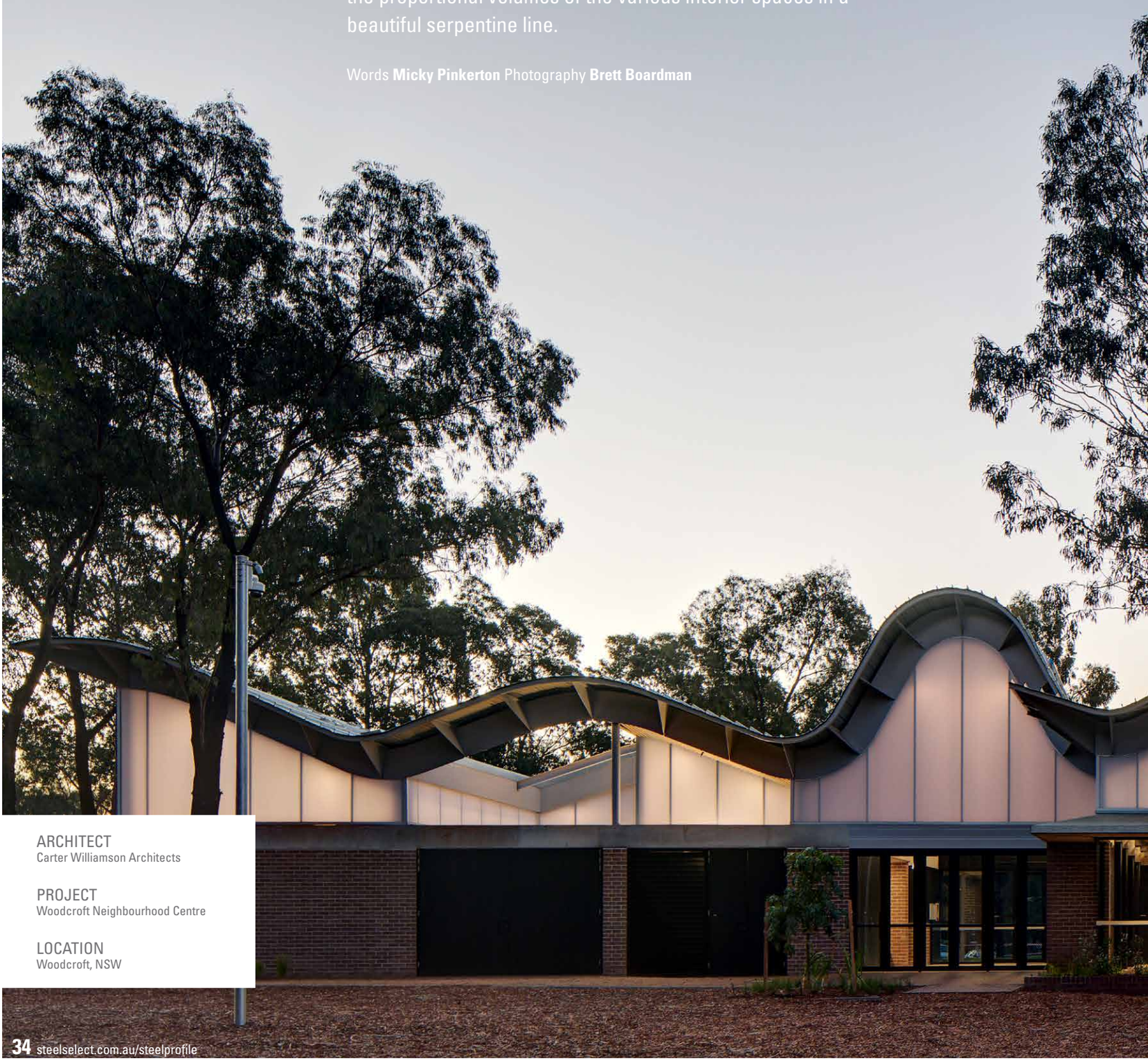
"My dad was a boilermaker and is now a steel estimator and I spent my younger years in the shed welding and using steel in an interesting way."

PROJECT: Symmons Plains Homestead **CLIENT:** Private **ARCHITECT:** Cumulus Studio **PROJECT TEAM:** Todd Henderson, Pippa Jensen, Phil Ackerly **PRINCIPAL STEEL COMPONENTS:** Bespoke windows and stairs: RHS 75mm x 50mm x 3mm, EA and TRU-SPEC® coil plate steel 5mm, PFC sections. **ROOFING:** Original heritage buildings: ZINC HI-TEN® steel (also known as 'Heritage Galvanised' steel) in the LYSAGHT CUSTOM ORB® profile; New building: COLORBOND® steel in the LYSAGHT KLIP-LOK CLASSIC® 700 profile in the colour Monument® **STEEL FABRICATORS:** Crisp Bros. & Haywards **STEEL MANUFACTURER (STEEL SECTIONS):** Orrcon Steel **BUILDER:** Mark Darke Building & Joinery and Von Stieglitz Builders **HERITAGE CONSULTANT:** Praxis Environment **HERITAGE STONEMASONS:** Past and Present Stonemasons **STRUCTURE:** Brierley Consulting Engineers **AWARDS:** 2020 Australian Institute of Architects Tasmanian Chapter, COLORBOND® Award for Steel Architecture - Commendation.

LOVE THY NEIGHBOUR

Rising from the ashes of its predecessor, which burned down in 2015, this suburban neighbourhood centre sets a new standard in community architecture. The design relied on steel to achieve the stunning roofline, which connects the proportional volumes of the various interior spaces in a beautiful serpentine line.

Words **Micky Pinkerton** Photography **Brett Boardman**



ARCHITECT
Carter Williamson Architects

PROJECT
Woodcroft Neighbourhood Centre

LOCATION
Woodcroft, NSW

Since the first few appeared in the 1960s, Australia's neighbourhood centres have gradually evolved with the times and social policy, morphing from small adult education centres into the multi-purpose community, allied health and cultural facilities we know today. Now numbering more than a thousand across the country, academic articles have been written trying to define exactly what a neighbourhood centre is. The most perceptive of these states that the question is actually redundant, as each centre continues to shape and re-shape itself, to become "something more besides" and concludes by asking whether a better question might be: "What can a neighbourhood centre become?[1]".

It's a question that Carter Williamson has thoroughly embraced and explored in this inspiring project, deep in Sydney's western suburbs, a stone's throw from Blacktown. Woodcroft is a small 1990s housing development on an old brownfield site that was previously home to a timberworks and then the State Brickworks. Both timber and brick are used in the building's material palette in reference to the site's history, but it's the ZINCALUME® steel roof which really captures the imagination and provides the centre with the requisite 'something' and a whole lot more besides.

The striking roof concept evolved from a simple brief, which required a range of flexible spaces to accommodate the centre's different groups and activities: smaller rooms for one-to-one meetings, a seminar space for up to twenty people, a large hall for more significant events. In short, the roofline reflects the different volumes of the interior spaces.

"We looked at each space through the idea of the golden mean – the idea of perfect proportion," explains architect Shaun Carter. "We wanted the roof to hold and shape the right proportions for each of the spaces that sat underneath it. So we started working out what heights those rooms needed to be, to be proportionally correct.

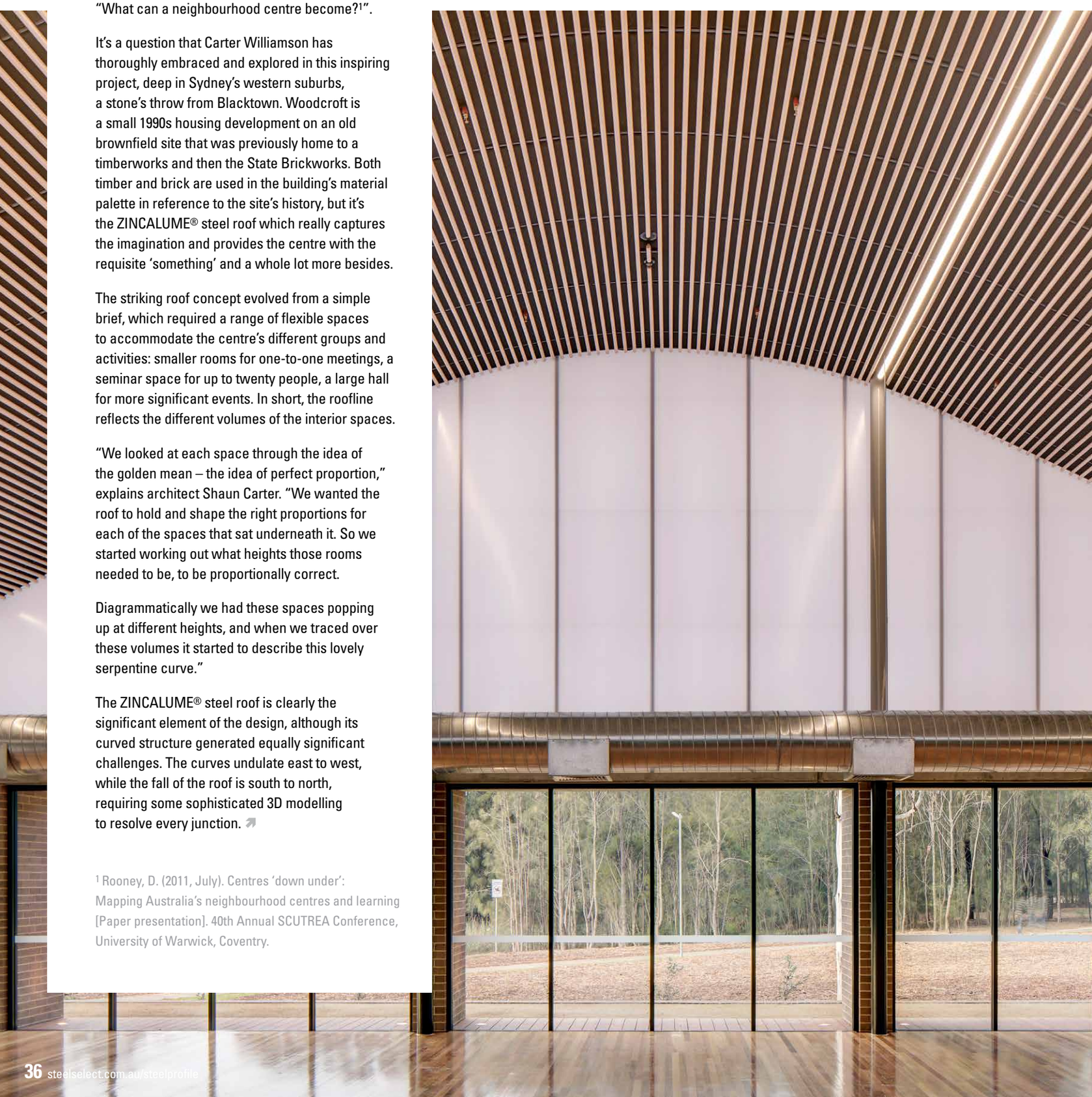
Diagrammatically we had these spaces popping up at different heights, and when we traced over these volumes it started to describe this lovely serpentine curve."

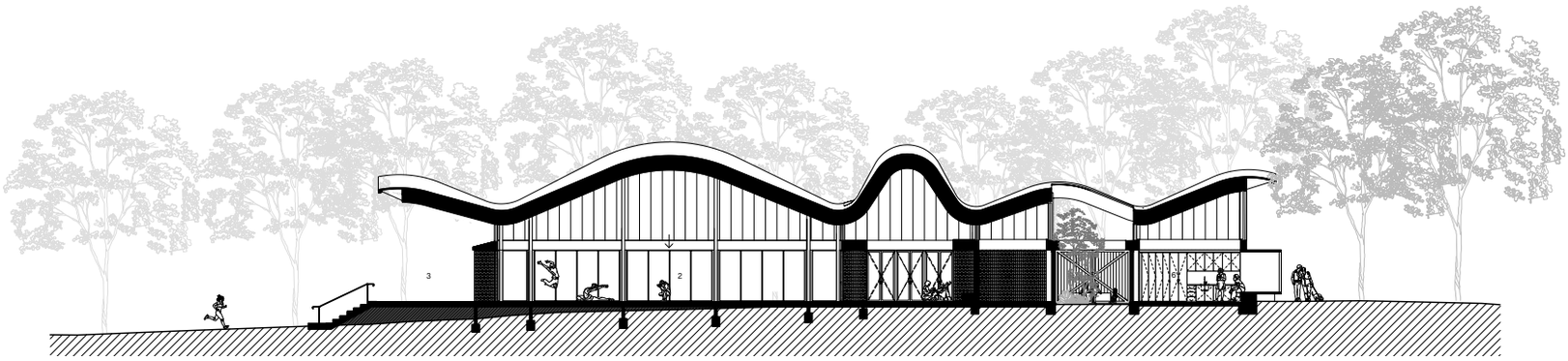
The ZINCALUME® steel roof is clearly the significant element of the design, although its curved structure generated equally significant challenges. The curves undulate east to west, while the fall of the roof is south to north, requiring some sophisticated 3D modelling to resolve every junction.

[1] Rooney, D. (2011, July). Centres 'down under': Mapping Australia's neighbourhood centres and learning [Paper presentation]. 40th Annual SCUTREA Conference, University of Warwick, Coventry.

BELOW: As the largest single space within the centre, the portion of the roof above the main hall features the largest span of each of the curves, a reflection of the volume of the space below. The deep serpentine line is supported by a selection of structural steel, including SHS, RHS and CHS.

OPPOSITE: The roof over the courtyard reveals the material palette of the building, with ZINCALUME® steel sheets*, timber, brickwork and concrete lintels all on display.





Long section looking south, courtesy of Carter Williamson Architects.

ABOVE: A construction scene at the centre, where the exposed skeleton of the roof shows the complexity in the design. CHS, RHS, SHS and EA in various widths were used to construct the shape, with no two pieces the same. (Image supplied by A Class Engineering.)

BELOW: Bending in three axes and undulating east to west, the Fielders FreeForm™ roof is testament to the versatility and workability of ZINCALUME® steel.

Even with models, fabrication and installation teams were faced with layers of complexity, with the curvature of the structure meaning each individual curve worked to a different radius.

Addressing this, ZINCALUME® steel sheets were individually rolled on site into the profile Fielders Freeform™, ensuring the roof's architectural requirements were met without compromising the quality and performance of the roof over time. Using a mobile rolling mill, the on-site team could produce precise roofing lengths and reduce the need for seams and expansion joints in the finished roof.

"It's extraordinarily complex and the only material we could see that could do that in a durable, tough, cost-effective, beautiful way was a steel roofing solution," says Carter Williamson associate Ben Peake. "The ZINCALUME® steel was able to handle the complexity of a roof that had to bend in three axes – with all of the surfaces being warped surfaces."

More than just a performance choice, the ZINCALUME® steel also represents an aesthetic reference to the industrial history of the site. "Carter Williamson has a long history of specifying ZINCALUME® steel in our work. It's a familiar and well-known material, but used at Woodcroft in an interesting way," says Peake.

As well as being key to the roof's success, steel was also integral to the construction of the building, with Circular Hollow Sections (CHS), Rectangular Hollow Sections (RHS) and Square Hollow Sections (SHS) framing the roof.

While Carter is an advocate for the fifth façade, he hasn't forgotten that a roof's undercarriage is what is actually visible for those beneath it, and the tapered ends of the thin steel finger elements in 8mm thick plate of this impressive skeleton structure peek out from generous timber soffits.

This follows an approach to the project which puts materials on display, with steel, brick, timber and concrete all left exposed. In a space required to be left relatively bare, the interplay of materials creates a dialogue of layered textures and finishes which brings a warmth to the centre and explores the layers of construction and creation.

So too, the confluence of curves and angles provides a lovely rhythm to the edges of the building, and provides a subtle reminder about which material is doing the heavy lifting on the project.

"Steel is such as wonderful material for making elements and edges fine so we used it to thin out the edge of the roof, so it wasn't too thick and chunky," says Carter. "We love metal roofs, and we

"Carter Williamson has a long history of specifying ZINCALUME® steel in our work. It's a familiar and well-known material, but used at Woodcroft in an interesting way."

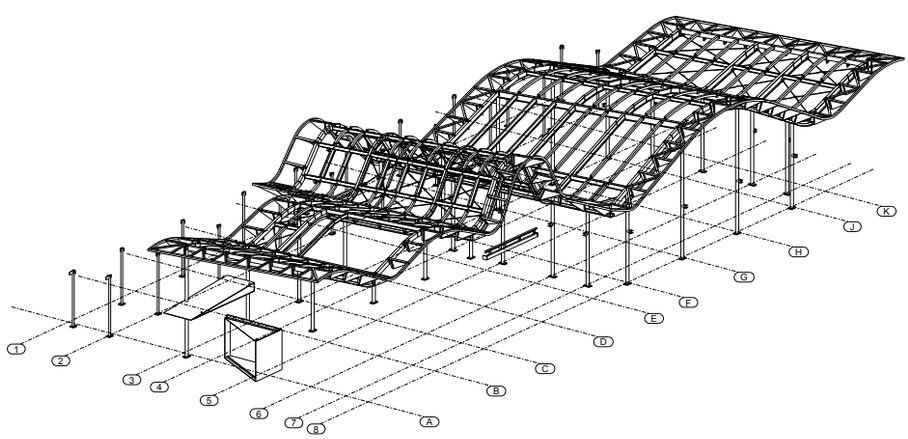
mostly work with COLORBOND® steel or ZINCALUME® steel. It's strong, it's durable, it feels like the Australian roofing material."

The delineation of the rise and fall of the roofline continues at night via opalescent polycarbonate infill panels between the roof and the brick datum line. It's an over-worn expression to say the building transforms into a lantern at night, but in this case it works and then some, with the flowing, floating ribbon of light giving an impression of the movement and activity within.

It's another way in which the building responds to its site and addresses the flaws of the previous centre. The building's site was re-oriented towards the park and its man-made lake – the flooded brickpit – and parking was re-located to be less of an imposition on both the built form and the surrounding landscape.

This allowed a stronger relationship between the centre and the park green where the annual Woodcroft Festival takes place.

ABOVE: The foyer's southern interior aspect reveals the highest single point of the roof's profile, with the expansive void created by the curve filled with sheets of white opalescent polycarbonate. BELOW: The 3D Model (supplied by A Class Engineering) was instrumental in the success of the entire project, allowing the team to work through the complexities of a profile where curves undulate east to west while the fall runs south to north.



ABOVE: Brick, concrete lintel and steel are left exposed inside the centre, creating a textural narrative that draws the eye to the building's curves and angles.

LEFT: The building's serpentine roof was made possible with the flexibility of Fielders FreeForm™, where the ZINCALUME® steel provides a strong and durable roof supported by Lysaght® Zed Purlins manufactured from GALVASPAN® steel, steel fingers and RHS.

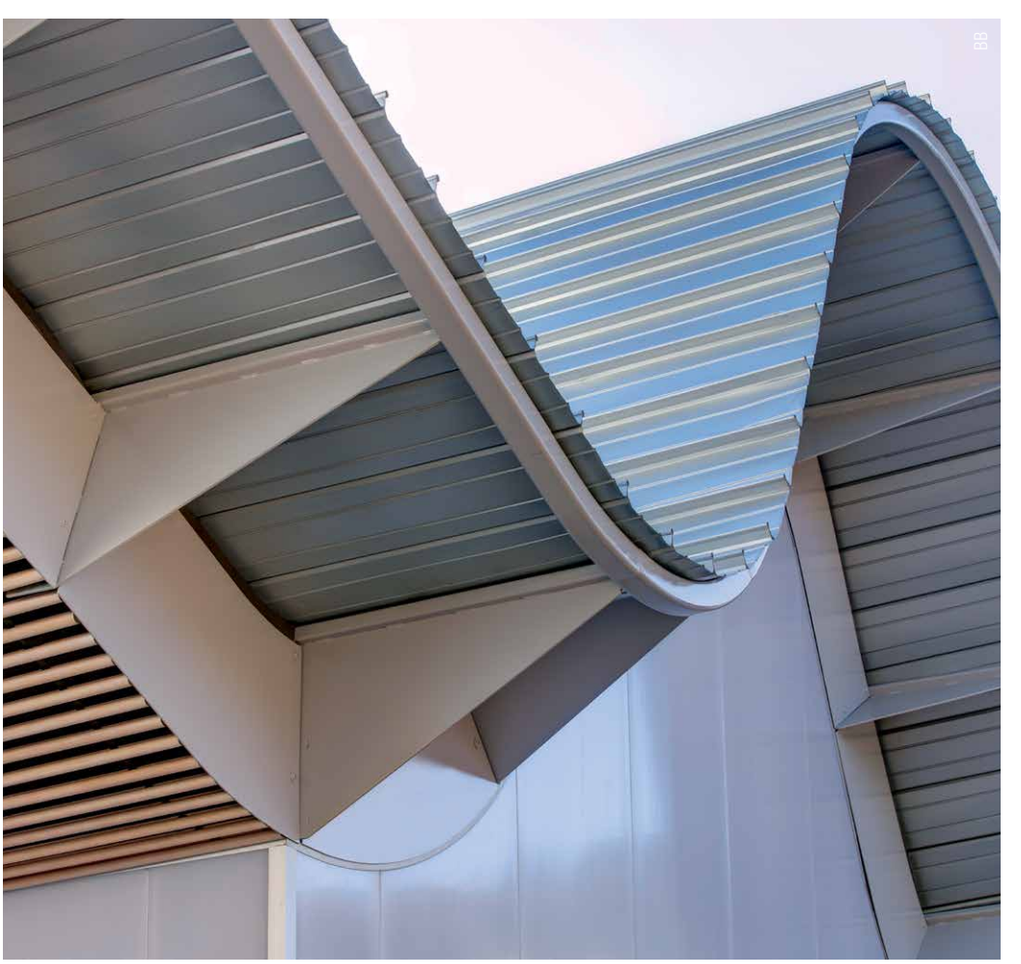
"We're conscious that this is public money so we want to understand how the building works on other levels, so we can give them something 'more'," explains Carter. "Which is why we set the building up to define the edge of a green square so that the veranda becomes the stage for public open days when it has to work at a scale of 2000 people."

"It's also a shaded place to sit in the middle of summer, it's a circulation path to take people from the street to the water: these are some of the other ideas at play which didn't cost any extra but responded to all these other programs."

Carter has nothing but praise for the builder, Westbury Constructions, and metal fabricator, A Class Engineering, who shared the studio's and the Council's ambition for the project and wanted it to be a 'signature' project for their businesses.

With no precedent to follow, each company and contractor was required to face and overcome their own challenges in the construction and to work consultatively to ensure the brief could be realised.

"This project seemed impossible at the beginning," said Tim Kennard, business development manager from A Class Engineering, "so we needed to apply a high level of detail during the drafting process to ensure we could meet the individual challenges of the project.



Wanting a stronger relationship between the centre and the surrounding parkland, the building was reorientated towards the man-made lake and opened up into the park. Here, steel beams support the building's low-pitched roofing over the veranda while timber soffits line the underside of the ZINCALUME® steel roof.

Of these, our biggest hurdle was for the sheer number of curves in the design, especially as no two curves had the same radius."

Luke Fredericks, construction manager from Westbury Constructions adds to this, citing the intricate roofing design as the biggest challenge for this team. "As the roof is a wave design, it falls in one direction but tapers in the other. The challenge was to make sure all the members planed correctly."

This new centre hasn't just replaced an old one but has created a facility and an environment that Carter describes as "a bit bigger than just itself" – a re-shaping that the Council anticipates will add to the suburb's identity and galvanise community pride.

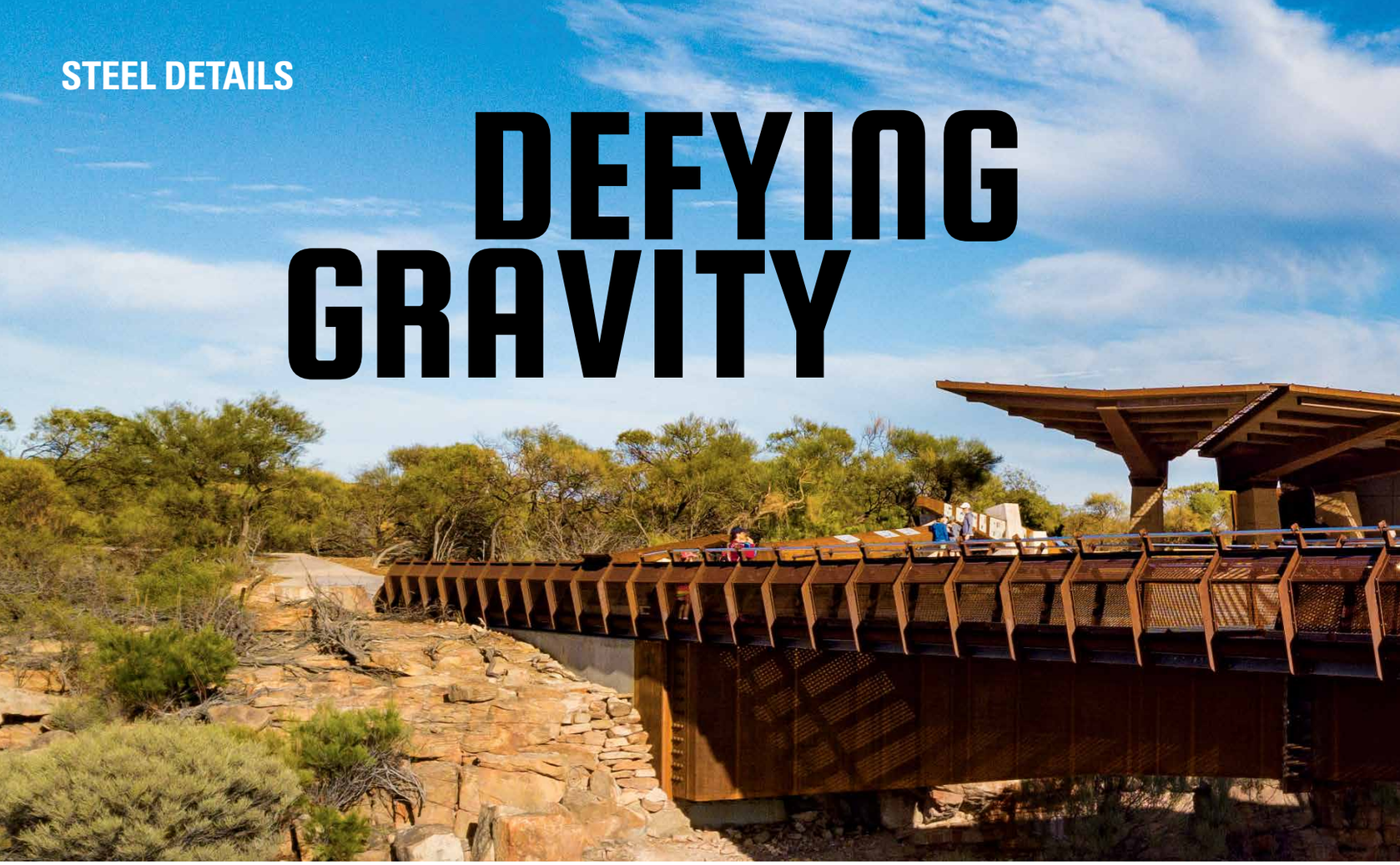
"... we needed to apply a high level of detail during the drafting process to ensure we could meet the individual challenges of the project..."

Indeed, this is not just an inspiring building for the local neighbourhood; it's an emblematic statement of its vitality and its status as an inclusive community driven by culture and shared well-being.

**Warranty subject to application and eligibility criteria. For full terms and conditions and to determine the eligibility of your project for warranty visit www.bluescopesteel.com.au/warranties or call BlueScope on 1800 064 384.*

PROJECT: Woodcroft Neighbourhood Centre **CLIENT:** Blacktown City Council **ARCHITECT:** Carter Williamson Architects **PROJECT TEAM:** Shaun Carter, Lisa Merkesteyn, Ben Peake, Julie Niass, Tai Danh Lien **PRINCIPAL STEEL COMPONENTS:** Roof sheeting: ZINCALUME® steel in Fielders Freeform™ profile, 0.55mm BMT, Purlins: Lysaght® Zed Purlins manufactured from GALVASPAN® steel **ADDITIONAL STEEL COMPONENTS**: 8mm Thick Plate, CHS, RHS, SHS, Equal Angles (EA), Universal Beams all supplied by Horans Steel. **BUILDER:** Westbury Constructions **METAL FABRICATOR, METAL SUPPLIER AND SHOP DRAWING CONTRACTOR:** A Class Engineering **STRUCTURAL ENGINEER:** Cantilever Consulting Engineers **CIVIL ENGINEER:** WGE Group **LANDSCAPE ARCHITECTS:** Melissa Wilson Landscape Architect **PROJECT TIMEFRAME:** November 2016 to June 2019 (Design, Documentation, and Approvals: Nov 2016 - December 2017; Construction Jan 2018 - June 2019) **AWARDS:** 2020 GOV Design Awards, Architecture: Community and Civic – Silver; 2020 Good Design Awards, Architectural Design: Commercial and Residential – Gold Winner **IPWEA:** (NSW) Engineering Excellence Award for Multi-Disciplinary Project Management **BUILDING SIZE:** 600m2 **TOTAL PROJECT COST:** $4.5m

DEFYING GRAVITY



Creating this iconic structure on the edge of a remote gorge was a true team effort, with input from architect, engineer, builder, shop drawer and client.

According to the client project manager Rory Chapple, from the Department of Biodiversity, Conservation and Attractions (DBCA), key personnel remained involved over the project's five-year duration – from initial sketch to completion – which helped enormously to overcome the challenges that arose along the way.

The brief called for a structure with a 100-year design life that would require low ongoing maintenance, and that blended into the surrounding natural landscape at the top of the gorge.

High-strength weathering steel from BlueScope – REDCOR® – was deemed a perfect choice for the cantilevered box beams and decking outrigger joist/baluster elements, because its naturally forming patina provides long-term corrosion protection without additional protective coatings. In addition, the material's rich colour mirrored the surrounding natural rock gorge face.

"As a major tourism project for the public, considerable architectural detailing was required to satisfy overall aesthetics, access and mobility requirements," architect Craig Poletti says. With few local precedents, the team carried out a technical review and evaluation of international projects to establish material properties, suitable welding materials, and detailing aspects to prevent any accelerated corrosion.

"One critical aspect was selecting connection elements that were compatible with the weathering steel," says Paul Terpkos, engineer. "High-strength friction grip (HSFG) bolts to the main box beam splices were selected based on their similar chemical composition to the weathering steel plate – preventing the potential for galvanic corrosion – and closer bolt spacings were documented to prevent crevices forming between the connected plates."

Construction sequencing meant that work on the skywalks had to be completed before the associated infrastructure could be built, and Bocol Construction engaged Westplan Drafting – the shop detailer – to create 3D BIM models of both skywalks and infrastructure elements in conjunction with in-house engineers.

"3D building information modeling (BIM) modelling enabled a medium to communicate accurate design information within the construction and client team, that could be visualized in real time," says Bocol's Dermot Boyle. "This enabled Bocol's engineering team to eradicate the greater part of both constructability and design issues that can occur with structures of this kind."

The massive box beams required extensive steel detailing because their tapered shape gives rise to varying dimensions and details along their length.

"To prevent confusion between the connection requirements, each box beam splice was detailed in plan and section," Poletti explains. "Typically, end plate thicknesses and stiffeners were standardised across both Skywalk 1 and Skywalk 2. Additionally, only two bolt sizes were used in the main box beam connections."

The remote location and cliff-top site created issues around buildability too, with each segment containing numerous parts, such as weathering steel spine beams; weathering steel frame and spacer plates; fiber reinforced plastic (FRP) joists; FRP floor grating; perforated weathering steel balustrade panels; stainless steel circular hollow section hand rails; stainless steel rectangular hollow section guard rails; and countless stainless steel fixings with nylon shoulder / insulating washers.

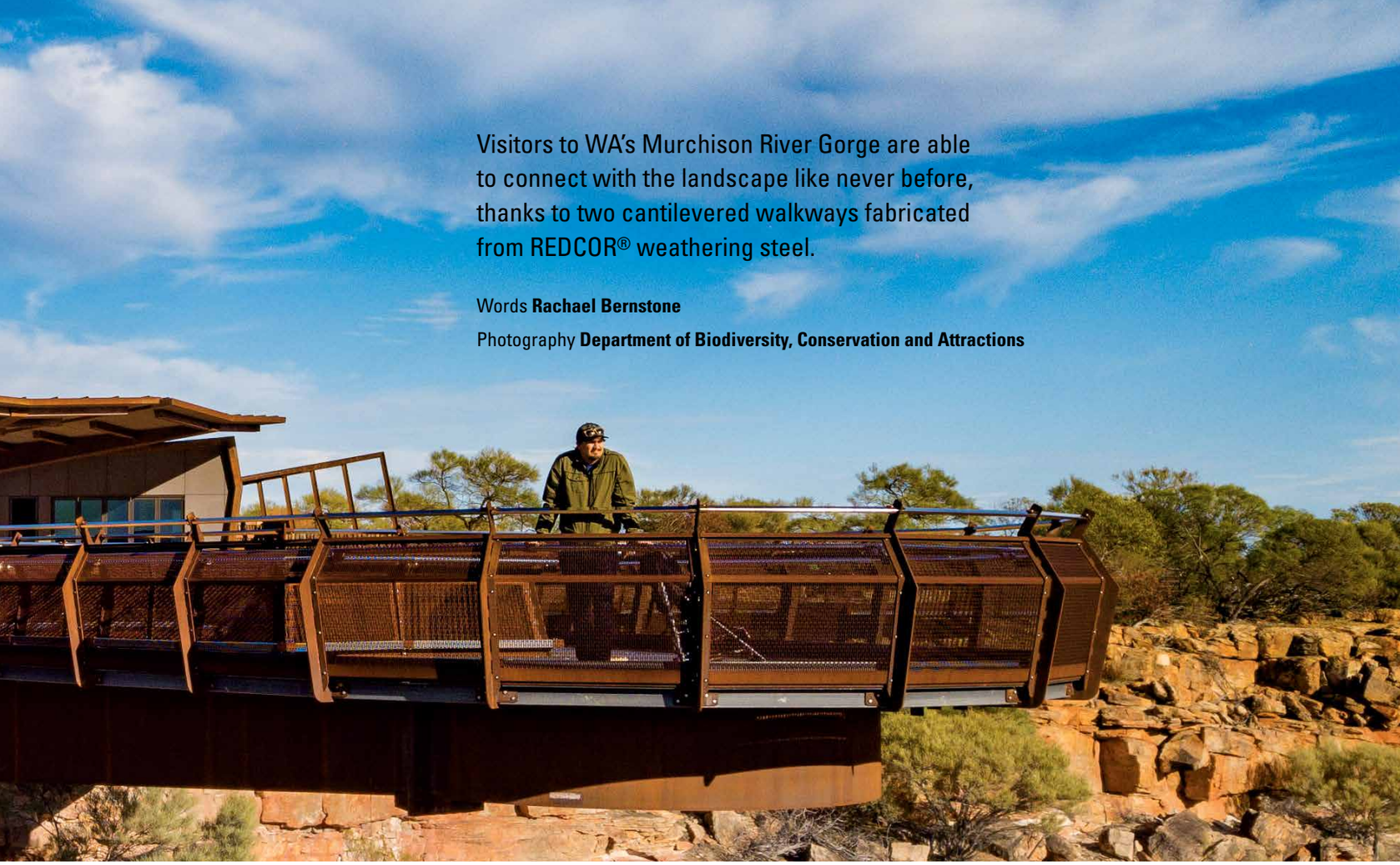
"In order to ensure all these aspects fitted together, we developed a complete trial assembly," Dermot Boyle says. "This allowed all of the smaller parts to be installed in the ease and safety of a Perth workshop. It also enabled the structure to be built in full – and the sleeve plate connection to the footings to be surveyed – to ensure the footings and structure matched, and it could be installed on site."

While these complexities may not be apparent to visitors, the teamwork that went into the creation of this project is just as noteworthy as the cantilevered structure itself.

Visitors to WA's Murchison River Gorge are able to connect with the landscape like never before, thanks to two cantilevered walkways fabricated from REDCOR® weathering steel.

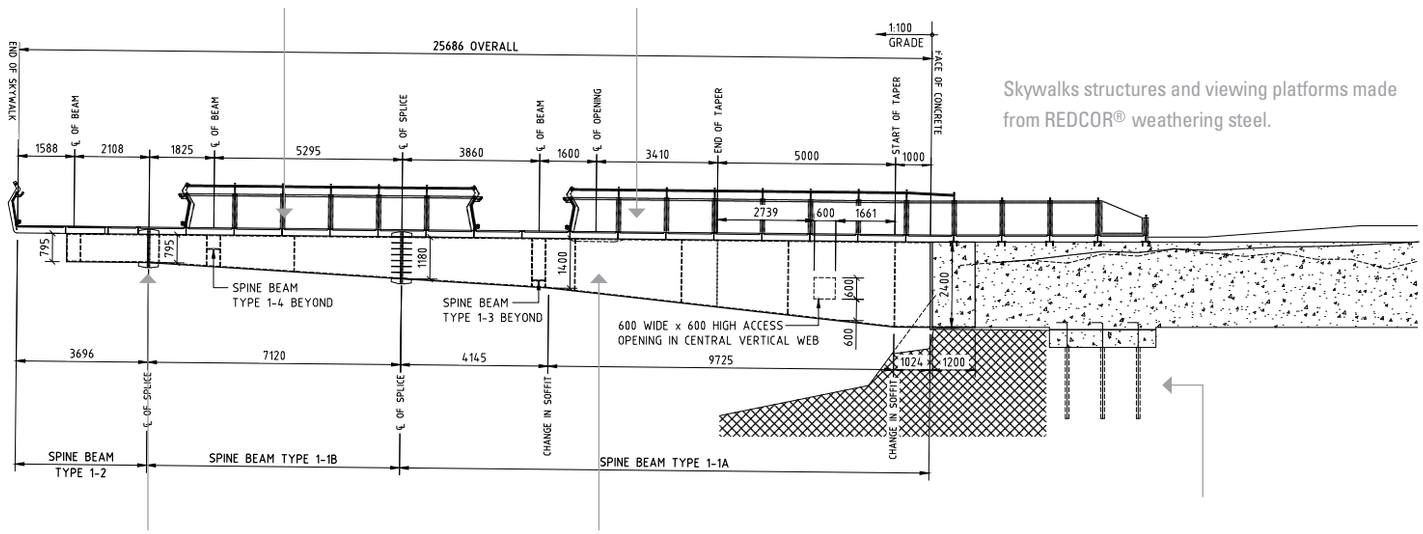
Words **Rachael Bernstone**

Photography **Department of Biodiversity, Conservation and Attractions**



REDCOR® weathering steel Skywalk balustrade post.

Perforated weathering steel balustrades.



Skywalks structures and viewing platforms made from REDCOR® weathering steel.

Spine Beam Profile made from REDCOR® weathering steel grade WR350.

Cantilevered box beams range from 2 to 2.2 metres deep forming the main spine and are made from REDCOR® weathering steel.

10-metre deep anchors concealed beneath 200m3 of sandstone landscaping.

PROJECT: Kalbarri Skywalk **ARCHITECT:** Eastman Poletti Sherwood Architects **PRINCIPAL STEEL COMPONENTS:** Weathering steel, including approximately 150 tonnes of BlueScope REDCOR® weathering steel AS/NZS 3678-WR350LO for the skywalks structures and viewing platforms; plus an additional 62 tonnes of REDCOR® AS/NZS 3678-WR350 XLERPLATE® steel in thicknesses ranging from 3mm to 60mm for the auxiliary buildings, kiosks, interpretive signage, artworks, shades and landscaping. **BUILDER:** Bocol Construction Pty Ltd **STRUCTURAL ENGINEER:** Terpkos Engineering **STEEL DETAILING AND 3D BIM MODELLING:** Westplan Drafting **STEEL FABRICATOR:** Alltype Engineering **STAINLESS STEEL FABRICATION:** Bouvard Marine **PERFORATED BALUSTRADE:** Kanyana Engineering Pty Ltd **FIBRE REINFORCED PLASTIC WALKWAYS:** FRP Engineering Pty Ltd **INFRASTRUCTURE CONTRACTORS:** GBSC Yurra Pty Ltd **GROUND ANCHORS:** Fortec Australia Pty Ltd **CLIENT:** Department of Biodiversity, Conservation and Attractions (DBCA) **PROJECT COST:** $13.2 million.

BlueScope

STEEL **PROFILE** # 131

9 320075 093976

steelselect.com.au/steelprofile